‘Integrated Monitoring’: Buzz Word or Basic Concept for Environmental Monitoring

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Fairmont Banff Springs

Introduction

- What is integrated monitoring?

- What are the benefits?

- How are environmental monitoring programs in Alberta changing?

- Initiating successful integrated monitoring programs

- USEPA Triad Approach

- Case studies of successfully applied integrated monitoring strategies

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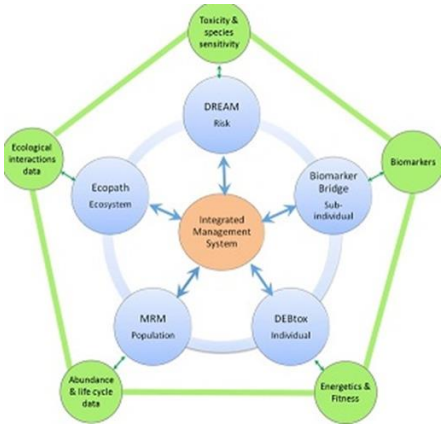
What is Integrated Monitoring?

Monitoring where systems are considered as a whole

Individuals coming together to collaborate on a common issue

Sharing data on ecosystem health

Images show complex linkages of inputs and outputs



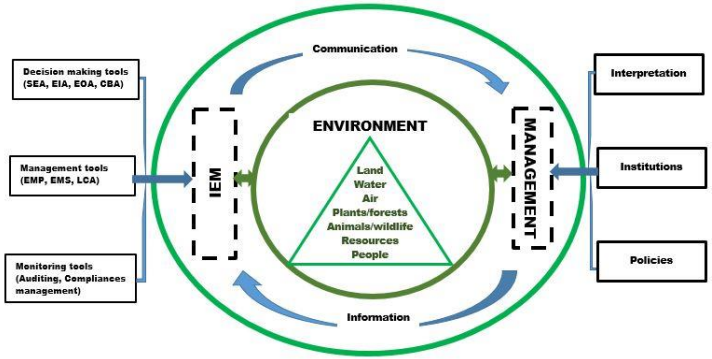


Figure 1 *An example of Schematic representation of IEM (Source: extracted from IEM matrix by Buhrs (1995) and Kumar (2013)*

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Province of Alberta

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT

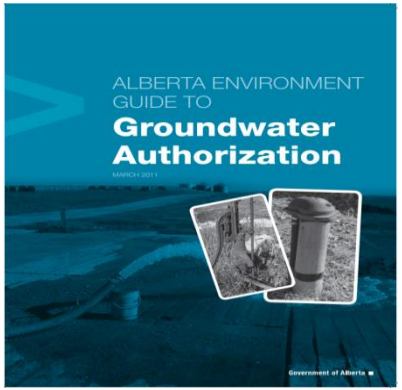
Revised Statutes of Alberta 2000
Chapter E-12

Current as of March 31, 2017

SOIL MONITORING DIRECTIVE

May 2009

Government of Alberta



Alberta Government

Environmental Protection and Enhancement Act
Guide to Content for Industrial Approval Applications

June 2, 2014

Alberta Government

Alberta Wetland Assessment and Impact Report Directive

June 2017

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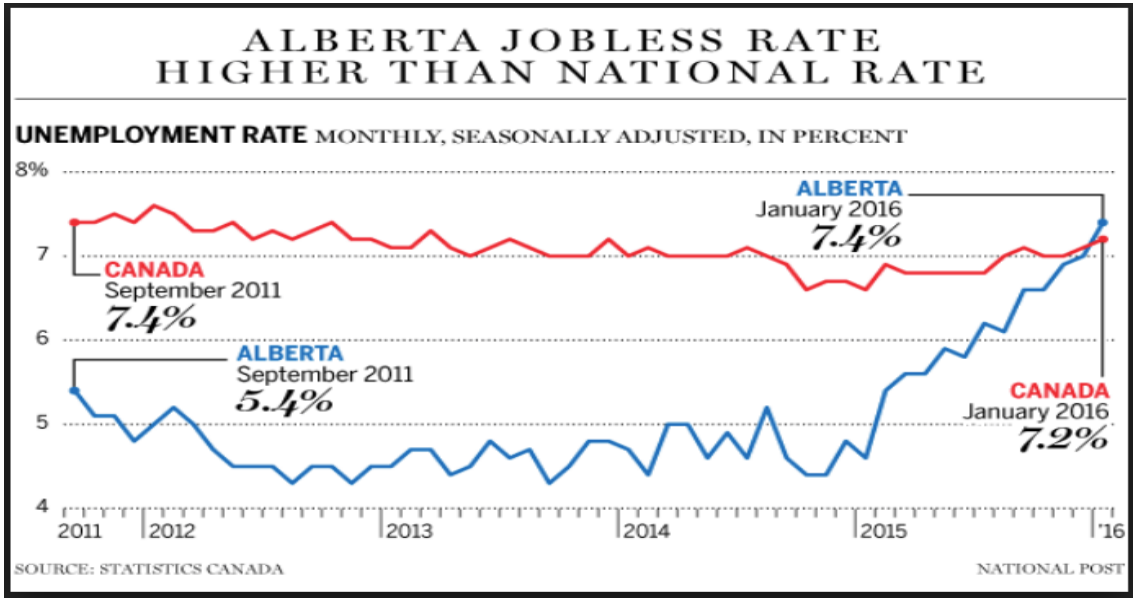
The New Normal in Alberta



- Increased pressure on cost reduction
- Increased pressure to demonstrate efficiency
- Increased pressure on environmental scrutiny

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Response to Changing Industrial Climate

APEGGA changes its name; new CEO comes from military

The professional engineering licensing association in Alberta, APEGGA, has dropped a "G" and is to be known from now on as APEGA.

March 27, 2012
by Canadian Consulting Engineer

Categories

Companies & People

Tags

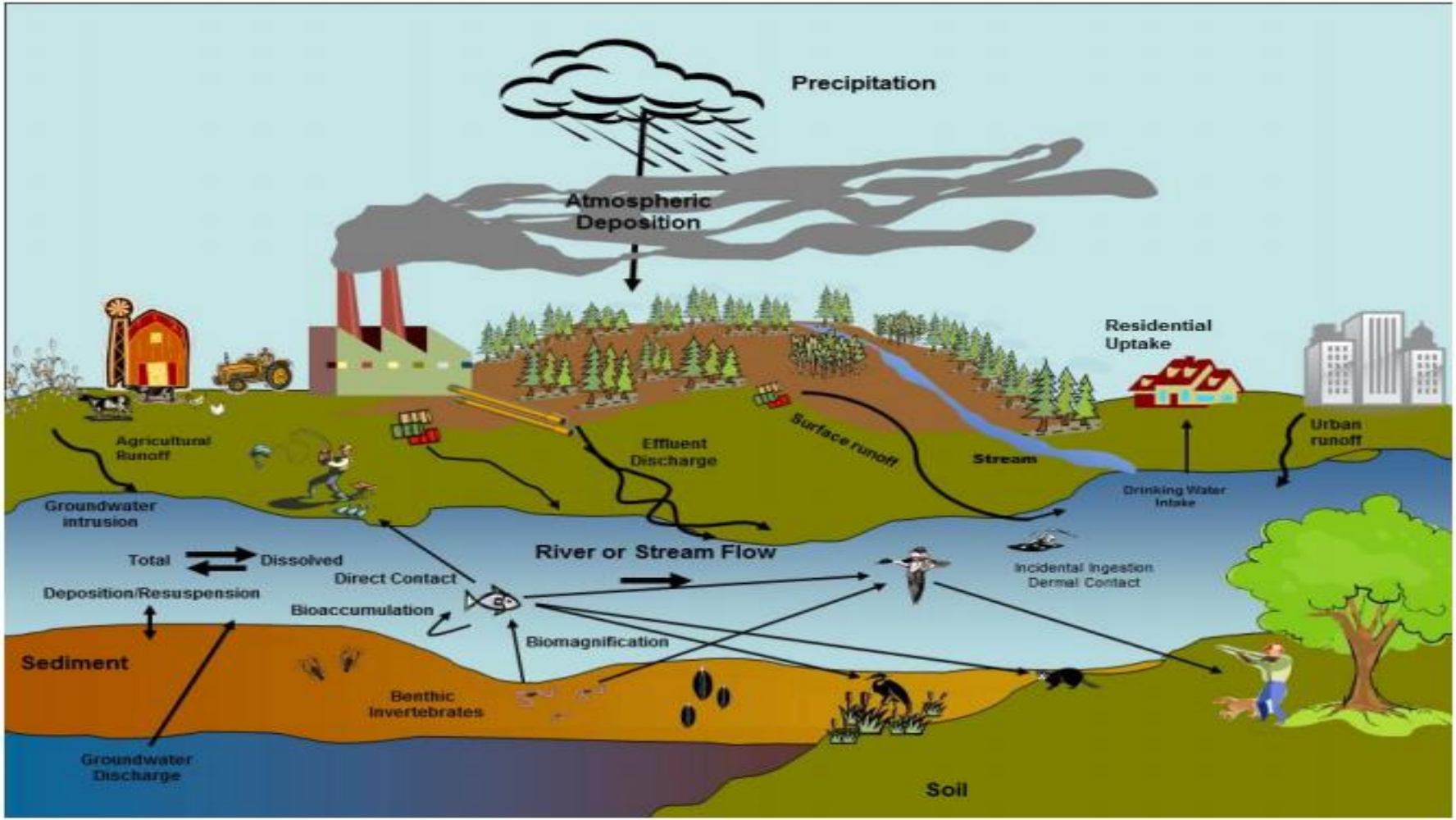
Engineering

The professional engineering licensing association in Alberta, APEGGA, has dropped a "G" and is to be known from now on as APEGA.

Formerly the Association of Professional Engineers, Geologists and Geophysicists of Alberta, the association has condensed two of its groups and is now licensing geologists and geophysicists under one title as professional geoscientists, or "P.Geo." The province was the last jurisdiction in Canada to separately license geologists and geophysicists.

The change affects 3,730 licensed professional geologists and 1,130 professional geophysicists, who from now on will use the P.Geo designation.

APEGA president Jim Smith, P.Eng., noted that the change is important because it keeps up with developments. For example, emerging disciplines such as environmental geoscience "need to be regulated but currently fall between the two existing professions," he says.


Precipitation
Atmospheric Deposition
Residential Uptake
Agricultural Runoff
Effluent Discharge
Surface runoff
Stream
Urban runoff
Drinking Water Intake
Groundwater intrusion
Total
Dissolved
Deposition/Resuspension
Direct Contact
Bioaccumulation
River or Stream Flow
Incidental Ingestion
Dermal Contact
Biomagnification
Sediment
Benthic Invertebrates
Groundwater Discharge
Soil

Response to Changing Industrial Climate

Skills

You will need:

- an excellent level of numeracy;
- scientific knowledge across the range of disciplines;
- mathematical modelling skills;
- the ability to visualise geology and conceptualise groundwater flow in three dimensions;
- the skill of drawing conclusions from incomplete information;
- the capacity to evaluate complex data;
- project management skills;
- an organised and flexible approach to work;
- commercial awareness;
- teamworking skills;
- oral and written communication skills, including report writing;
- IT skills.

Have we seen such pressures before?

Santa Barbara Oil Spill (1969)

Have we seen such pressures before?

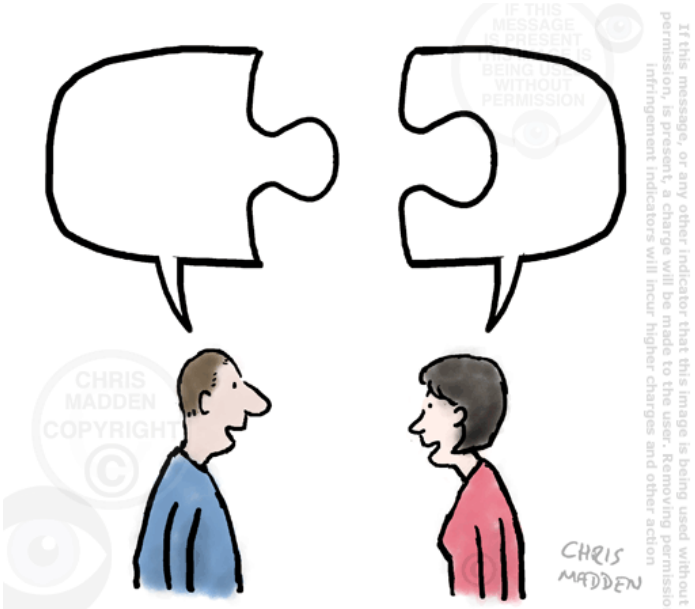
Cayuga River Fire (1969)

The Key to Establishing Integrated Monitoring

Integrated monitoring is understanding the interface between disciplines.

It is a comprehensive assessment of the site: the physical properties, geometry and understanding of the site's issues and potential concerns.

It is understanding of how an impact identified by one or more disciplines has an effect on other disciplines' results and more importantly, understanding the significance and relevance of any identified impacts.



Approaches for Success: Easy Wins

Cross-training field staff

Combining monitoring event schedules

Use of consistent data collection, reporting templates

Project management efficiencies of combined programs

Why is integrated monitoring difficult to achieve?

Road to Failure:

- setting unachievable goals or timelines
- poor study design or lack in identifying technical disciplines
- inadequately stakeholders identification
- layering integration on top of silos
- communication issues
- working in isolation

Identify the Goal

A key to successfully implementing an integrated environmental monitoring program is identifying what the monitoring will achieve:

1. Site closure?
2. Risk assessment and protection of sensitive receptors?
3. Regulatory compliance?
4. Acceptable public perception?
5. A research project?
6. Establish baseline, trends, cumulative effects?
7. To inform policy design and decision-making?

Investing in Integration

Keys to Success:

- clear, effective communication
- a common agenda working towards aligned goals
- sharing of data between disciplines
- close collaboration with various technical discipline experts
- strong leadership to support fostering and maintaining cooperation

Key to Integration – Understanding Linkages

Ensure the team understands the correlations and interdependencies between disciplines

Ensure the team has bought into the overarching goals

Engage specialists in the project scoping phase, throughout project execution and during review

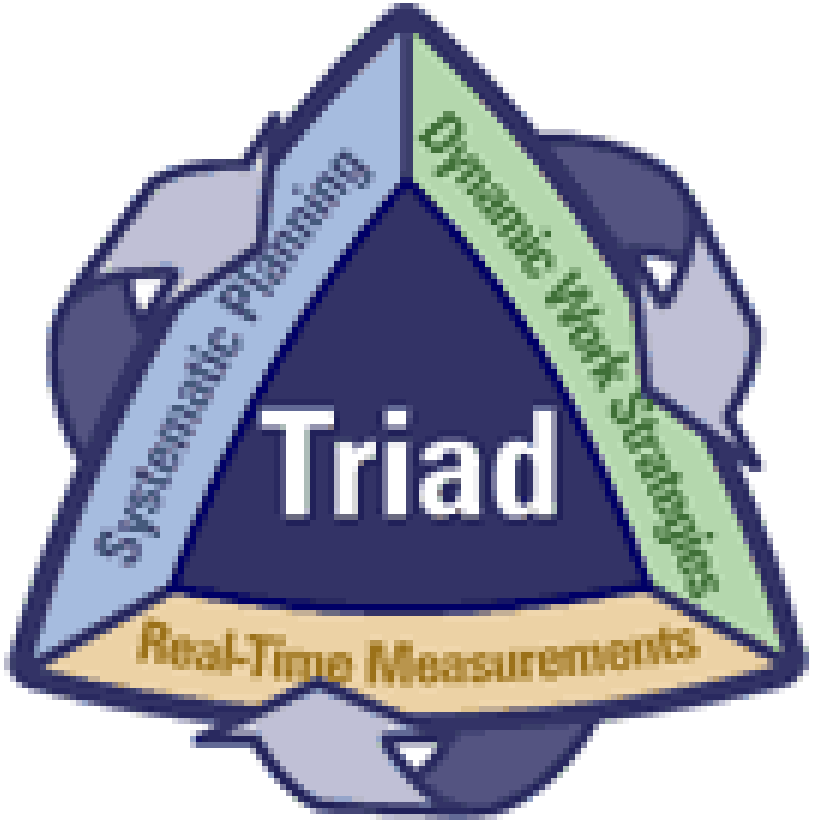
Utilize a variety of visualization tools to confirm understanding between various disciplines

Focus on desired outcomes and center decision making to support an aligned vision

US EPA Triad Approach (Triad Resource, 2004)

A technically defensible methodology for managing decision uncertainty that leverages innovative characterization tools and strategies.

The Triad refers to three primary components, systematic planning, dynamic work strategies and real-time measurement systems.



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The Triad Approach – Systematic Planning

- sound CSM development to support decision making.

- evaluation of decision uncertainty and management of uncertainty in context of CSM.

- allows CSM to evolve and mature as information becomes available.

The Triad Approach – Dynamic Work Strategies

-work plans that incorporate flexibility to change or adapt to information generated by real-time measurement technologies.

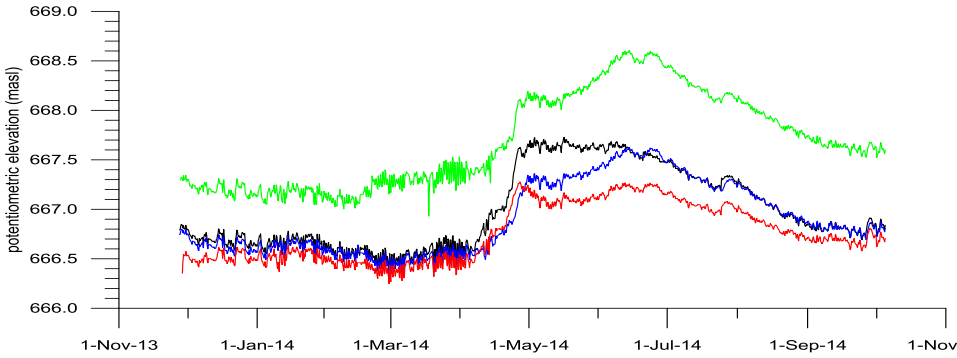
- as information is available, decisions are made regarding subsequent activities to resolve remaining data uncertainties.

The Triad Approach – Real-Time Measurement

- readily available data that is sufficiently reliable to base decisions.

- could be screening methods, rapid laboratory turn-around, field-based measurement technologies.

- data is obtained quickly enough to influence progress of data collection within the field.



Case Study – Integrated Environmental Monitoring

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Summary

- What is integrated monitoring?

› Collaboration, cooperation and teamwork

› Understanding the interfaces between disciplines

- What are the benefits?

› Holistic view of site management.

› Using the linkages between disciplines to better understand uncertainty

› Evolution of the conceptual site model to work toward project goal.

The economic climate in Alberta is causing a push towards high quality technical data, on tight schedules, at the lowest possible cost.

The way to achieve this is through integrated monitoring!

Values that guide us

Our values keep us anchored and on track. They speak to how we run our business, how we express ourselves as a group, and how we engage with our stakeholders and inspire their trust.

Teamwork & excellence
We're innovative, collaborative, competent and visionary.

Customer focus
Our business exists to serve and add long-term value to our customers' organizations.

Strong investor return
We seek to reward our investors' trust by delivering competitive returns.

Health & safety, security and environment
We have a responsibility to protect everyone who comes into contact with our organization.

Ethics & compliance
We're committed to making ethical decisions.

Respect
We consistently demonstrate respect for all our stakeholders.