FINAL PROGRAM

Assessing and Managing Cumulative Environmental Effects

- *What works?*
- *What doesn't?*
- *How do we improve cumulative effects assessment and management?*

A special topic meeting of the

International Association for Impact Assessment

IAIA

6-9 NOVEMBER 2008

THE WESTIN CALGARY • CALGARY, ALBERTA, CANADA

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PROGRAM COMMITTEE

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ABOUT IAIA

The **International Association for Impact Assessment** promotes and perfects the use of impact assessment.

The inputs and results of this special topic meeting are expected to help IAIA document and disseminate good practices in the assessment and management of cumulative effects and are also intended to contribute to the update of the 1996 effectiveness study.

MEETING SCHEDULE

DAY 1 ■ THURSDAY, 6 NOVEMBER

08.55 – 10.30	**Opening plenary**
10.30 – 11.00	*Break*
11:00 – 12.30	**Theme forums and session**
12.30 – 13.30	*Lunch*
13.30 – 15.00	**Theme forums and session**
15.00 – 15.30	*Break*
15.30 – 17.00	**Theme forums**
17.30 – 18.30	**Welcome reception* and poster session** **Hors d'ouevres and cash bar.*

DAY 2 ■ FRIDAY, 7 NOVEMBER

09.00 – 10.30	**Theme forums and session**
10.30 – 11.00	*Break*
11.00 – 12.30	**Theme forums and session**
12.30 –13.30	*Lunch*
13.30 – 15.00	**Theme forums and session**
15.00 – 15.30	*Break*
15.30 – 17.00	**Theme forums and session**

DAY 3 ■ SATURDAY, 8 NOVEMBER

09.00 – 10.30	**Plenary**
10.30 – 11.00	*Break*
11.00 – 12.30	**Theme forums**
12.3015 –13.30	*Lunch*
13.30 – 15.00	**Theme forums**
15.00 – 15.30	*Break*
15.30 – 17.00	**Theme forums**

DAY 4 ■ SUNDAY, 9 NOVEMBER

09.00 – 10.30	**Traditional Calgary pancake breakfast**** *Tickets for breakfast may be purchased at the registration desk on Friday.*
10.45 – 12.00	**Concluding plenary**

REGISTRATION DESK HOURS

Wednesday, 5 November	**15.00-17.00**
Thursday, 6 November	**08.00-15.30**
Friday, 7 November	**08.00-15.30**
Saturday, 8 November	**08.00-15.30**

WHY THIS MEETING IS IMPORTANT

In response to several recent surveys, IAIA members agreed that the current processes for impact assessment, strategic planning and resource management do not effectively address cumulative effects.

Experience with assessing and managing cumulative environmental effects in EIA dates back to the early seventies in the US, slightly later in Canada. Despite this track record, cumulative effects remain an area of continuing difficulty in impact assessment and resource management practice in nearly all countries.

Many practitioners also believe that cumulative effects are increasing in severity and across larger scales in time and space. In some cases, this is connected to global or world-wide changes, such as climate change and biodiversity loss, through processes and interactions that are not well understood. For most purposes, the regional or ecosystem level will provide the more appropriate framework for assessing and managing cumulative effects of policies, plans and projects, particularly against critical thresholds of resource productivity and ecosystem integrity, resilience and health. Ecosystem approaches are not only scientifically challenging but also typically expose institutional and policy gaps that impeded their translation into action.

This meeting will highlight the track record of our experience, focusing on what works well, what does not work and where improvements are needed in coming to grips with cumulative effects.

DELEGATES CAN EXPECT

- Exposure to state-of-practice information
- Professional networking opportunities
- Learning about relevant case studies and approaches used
- Identification of effective methods for the practice of CEA
- Brainstorming on ways to better address cumulative effects management and synergistic cumulative effects

Photo courtesy of Steve Van Dyke

Photo courtesy of Roger Creasey

Photo courtesy of Suncor Energy Inc.

THE PROGRAM

The program takes stock of key trends, issues and approaches to cumulative effects; identifies areas of strength and weakness of current impact assessment and resource management approaches in addressing cumulative effects; documents good practice and ways forward to improve and integrate the institutions, science and practice of cumulative effects assessment and management; includes plenary, theme, concurrent and poster sessions, and features invited speakers for plenary and theme forums.

The meeting represents an important opportunity to review progress and exchange ideas on the lessons of North American and international experience in this field. It is aimed at improved professional practice in assessing and managing cumulative effects.

Theme forums and sessions address four focal themes and key sector and system categories:

1. **Institutional arrangements** (including legal and policy frameworks, processes and instruments) for assessment, planning and management of cumulative impacts.
2. **Science-based frameworks**, **knowledge systems** and **methodologies and tools** in support of decision-making, particularly within sustainability frameworks.
3. **Operational practice** in analysis, mitigation and monitoring of cumulative effects and in ex-post evaluation of process, practice and performance.
4. **Integrated approaches** that demonstrate the effective linkage of institutions, science and practice in strategic (top down) and/or project (bottom up) approaches to assessing and managing cumulative effects.

The focus on institutional arrangements examines the status and effectiveness of various legal, policy and procedural frameworks used to manage and regulate cumulative impacts on terrestrial, atmospheric, freshwater and marine ecosystems with opportunities for comparative analysis and lessons for improvements.

The focus on scientific knowledge and information about cumulative impacts reviews the state of the disciplines and professions necessary to understand the functioning of natural systems in the context of assessing loss, change, risk, uncertainty and consequentiality, including the linkages to economic and social effects; and to identify key strengths, weaknesses, opportunities and threats and priorities for research and monitoring to address major gaps.

The focus on practices addresses the application of scientific methodologies and management tools for assessment of cumulative effects, including mitigation, compensation (offsets), monitoring and evaluation of compliance with and effectiveness of regulatory and policy requirements; and explores what has worked well and what needs improvement with a view to benchmarking lessons learned and future directions

The focus on integrated approaches explores frameworks and examples of the coordinated deployment of institutional arrangements, scientific methodologies and sound practice to deliver effective outcomes to manage long term cumulative effects and support sustainability.

The focus on key sector and system categories reviews experiences with the application of cumulative effects assessment and management for key sectors (e.g., oil sands development, conventional oil and gas development, highways, etc.) and systems (e.g., terrestrial and marine ecosystems).

TECHNICAL PROGRAM OVERVIEW

	Britannia	Belaire	Mayfair
Thursday, 6 November			
08.55-10.30	CEA Science, Institutions, Practice and Integration *Opening Plenary*		
10.30-11.00	*Break | Grand Foyer*		
11.00-12.30		CEA in Marine Environments: Case Studies *Theme Forum*	Sector-Based CEA and SEA *Session*
12.30-13.30			
13.30-15.00		CEA in Marine Environments: Case Studies *Theme Forum*	Sector-Based CEA and SEA *Session*
15.00-15.30	*Break | Grand Foyer*		
15.30-17.00	Environmental Sustainability & CEA Theme *Forum*	CEA of Oil & Gas Developments on Alaska's North Slope *Theme Forum*	Sector-Based CEA and SEA *Session*
17.30-18.30	Welcome Reception and Poster Session | *Grand Foyer*		
Friday, 7 November			
09.00-10.30	Oil Sands (Part 1) *Theme Forum*		Sector-Based SEA and CEA *Session*
10.30-11.00	*Break | Grand Foyer*		
11.00-12.30	Oil Sands (Part 2) *Theme Forum*		A Toolkit of Emerging Methods for CEA *Theme Forum*
12.30-13.30	*Lunch*		
13.30-15.00	Case Studies of CEA and Management in Western and Northern Canada *Theme Forum*		A Toolkit of Emerging Methods for CEA *Theme Forum*
15.00-15.30	*Break | Grand Foyer*		
15.30-17.00	Case Studies of CEA and Management in Western and Northern Canada *Theme Forum*		CEA Toolkit 2: Use of GIS *Theme Forum*
Saturday, 8 November			
09.00-10.30	Improving the Way Cumulative Effects Are Assessed and Managed: Future Directions *Plenary*		
10.30-11.00	*Break | Grand Foyer*		
11.00-12.30	Regional-Level SEA *Theme Forum*		CEA Toolkit 2: Use of GIS *Theme Forum*
12.30-13.30	*Lunch*		
13.30-15.00	Regional-Level SEA *Theme Forum*		Cumulative Effects Mitigation and Management at Sub-Regional Levels *Theme Forum*
15.00-15.30	*Break | Grand Foyer*		
15.30-17.00	Regional-Level SEA *Theme Forum*		Cumulative Effects Mitigation and Management at Sub-Regional Levels Theme *Forum*
Sunday, 9 November			
09.00-10.30		Traditional Calgary Pancake Breakfast	
10.45-12.00		What Was Said, Where to Next? *Closing Plenary*	

TECHNICAL PROGRAM OVERVIEW

Lake Louise	Lakeview	Mount Royal	Bonavista
Break | Grand Foyer			
Social, Cultural & Economic Aspects of Cumulative Effects *Session*			**Contributing to Healthy & Productive Aquatic Ecosystems** *Theme Forum*
Lunch			
CEA for International Development Projects *Session*			**Contributing to Healthy & Productive Aquatic Ecosystems** *Theme Forum*
Break | Grand Foyer			
			Contributing to Healthy & Productive Aquatic Ecosystems Theme Forum
Welcome Reception and Poster Session | *Grand Foyer*			
The Importance of Scoping in CEA *Session*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 1 (Breakout)*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 1 (Breakout)*	**Cumulative Effects and Health & Productive Aquatic Ecosystems** *Workshop-Part 1*
Break | Grand Foyer			
Selected CEA Best Practices *Session*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 2 (Breakout)*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 2 (Breakout)*	**Cumulative Effects and Health & Productive Aquatic Ecosystems** *Workshop-Part 2*
Lunch			
Climate Change and SEA *Session*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 3 (Breakout)*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 3 (Breakout)*	**Cumulative Effects and Health & Productive Aquatic Ecosystems** *Workshop-Part 3*
Break | Grand Foyer			
National Experience with CEA *Session*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 4 (Breakout)*	Cumulative Effects and Health & Productive Aquatic Ecosystems *Workshop-Part 4 (Breakout)*	**Cumulative Effects and Health & Productive Aquatic Ecosystems** *Workshop-Part 4*
Break | Grand Foyer			
			The Future Directions of Cumulative Effects: Making It Happen (Part 1) *Theme Forum / Workshop*
Lunch			
			The Future Directions of Cumulative Effects: Making It Happen (Part 2) *Theme Forum / Workshop*
Break | Grand Foyer			
			The Future Directions of Cumulative Effects: Making It Happen (Part 3) *Theme Forum / Workshop*

THURSDAY, 6 NOVEMBER

08.55-10.30

Opening Plenary: CEA Science, Institutions, Practice and Integration

Moderator: Barry Sadler | Britannia/Belaire/Mayfair

Welcome

Sachihiko Harashina, President of IAIA

State of Science of Cumulative Effects Assessment and Management (CEAM)

David Schindler

A) Key frameworks/concepts for assessing cumulative effects: what we know, what we need to know better (e.g., in response to current threats and risks) to gain a firmer grasp of sustainable use and development of managed systems.
B) Use and application of "best practicable ecological science" to address cumulative effects, e.g., in EIA, resource management policy and planning: what is done, what realistically could be done.
C) Potentials and challenges of taking an ecosystem-level approach: how robust is the science and the tools for analyzing cumulative effects of multiple actions on the functions and structure of ecosystems, how can/should it inform policy and management.
D) Ways forward/strategic directions for improving the science of CEAM: which priorities will give the best payoffs.

Canadian and International EA Frameworks as They Apply to Cumulative Effects

Robert Connelly

Key areas for consideration include:

A) Statutory requirements and procedures for taking account of cumulative effects: what must be done, what should be done (e.g., guidance, quality assurance).
B) Implementation and process application: how the EA process takes account of cumulative effects, how effective is the current approach (e.g., based on lessons of 5-year review, follow up work and management experience).
C) Potentials and challenges of instituting more strategic, regional or integrated processes to take account of cumulative effects: what examples we have to build on, what other measures are or might be entertained.
D) Ways forward/strategic directions.

State of Practice of Cumulative Effects Assessment and Management: The Good, the Bad and the Ugly

Larry Canter, Bill Ross

The historical, current, and anticipated future international practice of CEA will be addressed. The "context" of CEA will be explained relative to time, space, multiple actions, institutional requirements, and building upon experience. Challenges from scientific and policy issues and numerous uncertainties will be noted. CEA practice requires creativity; thus examples will be described relative to methods and appropriate focus on environmental sustainability. Finally, opportunities for mitigation and management will be summarized, with emphasis given to "collaboration" as a foundational element.

World Bank Experience with Integrating Science, Institutions and Practice in Cumulative Effects Assessment and Management

Stephen Lintner

Key focus will be on World Bank experience with integrating science, institutions and practice in cumulative effects assessment and management. This discussion will place integration in the context of the Bank's environmental and social safeguard policies and their application and performance with regard to cumulative effects.

11.00-12.30

Contributing to Healthy and Productive Aquatic Ecosystems: Strengthening Institutions, Science and Practice for Regulating the Impacts of Human Activities to Fish and Fish Habitat

DFO-Sponsored Theme Forum | Organizers and Moderators: Patrice LeBlanc and Neil Fisher | Bonavista

Introductory Remarks

Patrice LeBlanc

Keynote Address

Mimi Breton

Refocusing Cumulative Effects Assessment

Lorne Grieg

In recent decades, considerable attention has been paid to the issue of cumulative effects assessment (CEA). However, despite our ongoing dialogue there is still no broadly accepted definition of cumulative effects, except that they arise from some combination of multiple stresses. Assessment of cumulative effects in much environmental assessment (EA) practice remains both qualitative and distinct from EA focused on project effects. This treatment imposes important limitations for the ability of CEA processes to provide meaningful advice to decision makers on the future sustainability of impacted environments.

Regionally-Based Environmental Assessment: Are We Looking at the Next Wave in the Evolution of Environmental Assessment?

Tim Smith

The application of regionally-based approaches to environmental assessment may contribute to better informed and more streamlined project evaluation, while at the same time supporting strategic objectives for a region. With mounting expectations to more fully address cumulative and induced effects, to involve communities and Aboriginal groups in development planning, including consideration of alternative futures, and to better situate environmental assessment within an integrated environmental management framework, it seems clear that we can no longer rely exclusively on project-based environmental assessment.

CEA in Marine Environments: Case Studies and Experiences

Theme Forum | Organizer and Moderator: Jon Isaacs | Belaire

Cumulative Impact Assessment for Marine Fisheries Actions

Tamra Faris

Cumulative impacts may be objectively evaluated by establishing reference points with criteria for impact determination on environmental issues. A method is illustrated for federally regulated groundfish fisheries off Alaska managed under fishery management plans according to the Magnuson-Stevens Fisheries Conservation and Management Act. Major issues include Steller sea lion listed under the Endangered Species Act (ESA) whose range overlaps waters where these fisheries are conducted. The method has potential for adaptation and use in other marine fisheries management action analyses.

A Matrix-Based CEA Process for Marine Fisheries Management

Larry Canter, David Tomey

A two-component process for CEA studies prepared by NOAA Fisheries Service is described. The components are scoping and baseline, and impact analysis; each are comprised of requisite "building blocks." Scoping and baseline integrates affected environment and effects information from other non-fishing and fishing actions. Impact analysis incorporates baseline findings with the direct/indirect impacts of alternatives. Information is also included on matrix tables for study analyses and summarization. Examples of matrices are included, and key lessons are described.

A Systematic Approach to Cumulative Effects Analysis on Bowhead Whales

Jon Isaacs, Anne Southam, Taylor Brelsford

An environmental review concerning allocation for subsistence bowhead whaling by aboriginal peoples faced significant challenges addressing cumulative effects. Aboriginal subsistence hunting, historical commercial whaling, accelerating offshore oil development, and climate change must be considered when assessing effects on bowheads. Logical and transparent cumulative effects analyses are essential to the legal defensibility of a review. Cumulative effects were addressed in the EIS for Issuing Annual Quotas to the Alaska Eskimo Whaling Commission for a Subsistence Hunt on Bowhead Whales (2008-2012).

Sector-Based SEA and CEA

Session | Moderator: Charlotte Bingham | Mayfair

Roads and Rail

CEA in Swedish Road and Rail Panning: Improvement Suggestions

Lennart Folkeson, Hans Antonson, J-O Helldin

Suggestions to improve CEA in infrastructure planning were retrieved using focus groups comprising Swedish EIA/SEA professionals. Discussants suggested shifting focus from EIS to the EIA process, unconventional means of dialogue with actor groups, efficient teamwork between professionals, well-considered engagement of specialists vs. generalists, CEA integration in infrastructure planning, cooperation with spatial planning, development of CEA tools and widening their use, stronger incentives to raise CEA quality and status, experience from follow-up and development of the procurement instrument.

Enhancing Environmental Sustainability of Road Sector in Ethiopia

Abdissa Megersa Debela

It is evident that adequate road transport service is essential for the economic and social development of a country. In 1997, the government of Ethiopia placed increased emphasis on improving the quality and quantity of the road infrastructure and formulated a development program. The past technical and scientific gaps in the road infrastructure planning and implementation procedures, in terms of adequately addressing environmental issues, have become one of the reasons that led to this research.

Mining

Developing Good Practice for Managing the Cumulative Impacts of Coal Mining on Regional Communities in Australia

Daniel Franks, David Brereton, Chris Moran

With the ongoing rapid expansion of coal mining in Australia, cumulative (or multi-mine) community, economic and environmental impacts are assuming growing importance and rendering conventional mine-by-mine approaches to change ineffective. In this paper we detail efforts to enhance the capacity of the Australian coal mining industry to identify, assess, manage and monitor cumulative community, economic and environmental impacts and we report on progress toward the development of a good practice guide on managing cumulative impacts.

Supplemental Environmental Impact Statements for Two Gold Mining Projects on the Carlin Trend, Nevada, USA

Paul Pettit, Terry Grotbo

Two Final Supplemental Environmental Impact Statements expand upon the cumulative effects analyses originally presented in the Leeville and SOAPA gold mining projects EISs and incorporate qualitative and quantitative data collected since the original EISs were completed, expanded analyses of cumulative effects of the projects combined with other mining and land uses, and descriptions of analytical processes used to determine cumulative effects. Issues include air quality, water quantity and quality, vegetation resources, terrestrial wildlife and riparian and wetland resources.

THURSDAY, 6 NOVEMBER

Social, Cultural, and Economic Aspects of Cumulative Effects

Session | Moderator: Nick Taylor | Lake Louise

Tools for Social, Cultural and Economic Cumulative Effects Assessment in the NWT and Nunavut, Canada

Vicki McCulloch

The framework for assessing and managing cumulative effects in the Northwest Territories and Nunavut, Canada, continues to evolve. The challenges related to cumulative effects assessment and management generally are arguably more complex with respect to the social, cultural and economic aspects of the environment. This presentation will focus on the existing and emerging tools for more effective assessment of social, cultural and economic cumulative effects—including monitoring and adaptive management—both at a project-specific and regional context.

Enhancing Aboriginal Participation in Cumulative Effects Assessment (CEA) and Management

Bonnie Evans

This paper will provide:

A) Background information: the legal rights of aboriginal groups and why they are involved in CEA.
B) Aboriginal perspectives on CEA: the importance not only of environmental effects, but also of the impacts on a whole socio-cultural system.
C) Where the problem lies: the role of government, the role of industry, the role of consultants and academia, and the responsibility/accountability of aboriginal groups.

Looking Beyond Traditional Social and Economic Assessments to Enhance Community Well-Being

Marvin Stemeroff, Heidi Klein, Tomasz Wlodarczyk, Andy Keir

Traditional approaches to socioeconomic impact assessment have served project proponents and communities in the past. The current situation is different. Employment and income opportunities abound in resource-rich regions. The promise of jobs is not enough. The new focus is long-term community well-being with attention on enhancing human, social, physical, financial and natural assets. This requires a new approach for socioeconomic impact assessment. This paper illustrates one approach to incorporating community well-being into socioeconomic impact assessment.

Application of the Maximum Permissible Concentration for the Registration of Total Effect

Viktoryia Misiuchenka

Today in the Republic of Belarus there is lack of normative and legislative documents on the assessment and monitoring of cumulative consequences of the environmental pollution. There is a list (15 groups) of pollutants of additive harmful effect. These groups are made up by means of summing up the values of maximum permissible concentration of separate pollutants.

13.30-15:00

Contributing to Healthy and Productive Aquatic Ecosystems: Strengthening Institutions, Science and Practice for Regulating the Impacts of Human Activities to Fish and Fish Habitat

DFO-Sponsored Theme Forum | Organizers and Moderators: Patrice LeBlanc and Neil Fisher | Bonavista

Ecosystem-Based Approach to CEAM of Fish and Fish Habitat: Lessons from the AFS Symposium and DFO Workshop

Barry Sadler

A Framework for Making Ecosystem Approach to the Management of Fisheries Operational

Stratis Gavaris

An Ecosystem Approach for Management requires consideration of cumulative effects. A strategy specifies what will be done about human pressure using a reference to signal when the pressure is unacceptable. The reference is established from consideration of the response by valued attributes to alternative references. Cumulative effects can be decomposed into the contributions of activities to a pressure and the combined impact of pressures on an attribute. Such decomposition can facilitate management.

THURSDAY, 6 NOVEMBER

Cumulative Impacts on American Eel: Recent Approaches to Governance, Policy, Management and Biological Challenges

Rob MacGregor

The American eel is declining significantly in parts of its North American range and is now listed as endangered in Ontario. The decline appears to be related to the cumulative effects of fishing, habitat loss due to barriers and turbine mortalities. Recovery and conservation are further challenged by its unique biology and the complexity of management responsibilities spanning at least 25 jurisdictions. Despite the challenges, managers are working on integrated approaches aimed at ensuring coordinated science and management at the population level.

CEA in Marine Environments: Case Studies and Experiences

Theme Forum | Organizer and Moderator: Jon Isaacs | Belaire

Cumulative Effects Assessment in Marine Environments: Angola Case Study

Gary Wolinsky

The Cabinda Gulf Oil Company operates in a dynamic marine environment. A variety of factors influence the marine environment in Cabinda and contribute to local/regional ecological conditions, particularly the Congo River, which drains a 3.7 million km^2 basin and discharges more than 42,500 m^3/second (267317 bbls/second) of water into the CABGOC operations area. CABGOC conducts a variety of environmental monitoring activities to assess impacts around operations to fulfill regulatory mandates and better understand marine phenomena.

Assessing Cumulative Effects of Scientific Research: A Case Study on Alaska's Steller Sea Lions

Jon Isaacs, Anne Southam

In 2000, Congress appropriated $80 million for NMFS to research the decline of and develop conservation measures for Steller sea lions, an ESA-listed species. This funding brought challenges for NMFS in coordinating research. The Humane Society of the United States filed a lawsuit, alleging authorized research activities could have irreversible effects on Stellers. So NMFS produced an EIS to address impacts and enlisted an independent panel to verify appropriate research methods and develop a monitoring program to mitigate impacts.

Cumulative Effects in the Norwegian Management Plan for the Barents Sea

Erik Olsen

In 2006 Norway implemented an integrated, ecosystem-based management plan for the Barents Sea. Strategic goals and area-based management frameworks for the human sectors fisheries, shipping, petroleum and external influences have been set based on sectorial EIAs, assessment of cumulative impact and analysis of area use. Analyses in the sectorial EIAs ranged from quantitative to qualitative making cumulative impact assessment difficult, resorting to the precautionary approach where cumulative impacts were difficult to determine.

Sector-Based SEA and CEA

Session | Moderator: TBA | Mayfair

Special Events

Cumulative Effects Assessment and the 2010 Olympics

Dan Kellar

The 2010 Winter Olympics are being held in the Vancouver-Whistler Corridor. Twenty projects are directly linked to the Olympics and most of these projects had an EIA undertaken to assess their impacts, yet these projects were all assessed in isolation from one another. This paper will discuss the failures of the Canadian EIA process in dealing with the cumulative effects of multi-site development projects and the weaknesses in assessing cumulative environmental effects at individual project sites.

Oil and Gas Developments (Part 1)

Cumulative Effects Assessments in Alberta's Oil Sands Region: Challenges and Opportunities

Robin Cockell, Steven Strawson, Trevor Cuthbert

The current pace of development in Alberta's Oil Sands Region has made CEAs the focus of a global audience. While these CEAs are subject to more scrutiny, they are likely supported by more regional data/research than any other EIAs in the world. Advancements in methods have provided greater understanding of aquatic and terrestrial ecosystems, but also highlighted related challenges. This presentation will review how Oil Sands CEAs are being completed, and discuss challenges and opportunities facing EIA practitioners.

Effect of Oil-Hydrocarbons on Marine Organisms: A Role of Environmental Variability (A study based on results from laboratory and hydrographic data from Angola, collected by R/V *Dr. Fridtjof Nansen*)

Bjorn Serigstad, Marek Ostrowski, Bomba Basika Sangoloy

Temperature, salinity, light conditions, etc., may have stronger impacts on a test organism than does the chemical itself. The design of biotests should be based on the information of the living resources and their natural environment in the area of concern. These requirements are somewhat contradictory to an overall wish for standard test methods. In Angola, such activities are in progress and will be supported by Norway. Our research vessel, *Dr. Fridtjof Nansen*, is an effective tool for these studies.

CEA for International Development Projects

Session | Moderator: Charlotte Bingham | Lake Louise

Small Scale Community Based Activities and Cumulative Environmental Effects in East Africa

Douglas Ouma

Cumulative environmental effects which are often not obvious and not profiled are the small scale community based activities. Activities which are "small" and "not significant" during construction accumulate over time, presenting serious cumulative environmental effects/impacts. CIANEA network promotes good practice of small scale community based activities implemented within principles of environmentally sound design. This paper shows its best practice guide and a case study of the successful implementation water programmes in South Sudan and its replication in eastern Africa.

Cumulative Effects of Small Scale Projects in Madagascar

Vaniah Emode Andrianjaka

In Madagascar, small scale projects occur everywhere. Due to the size of investment, good practice is ignored. This paper will show the situation of the effort that is being carried out in the country and will examine the experience with the cumulative effects assessment and management in order to present the problems met and to discuss the improvement required.

Incorporating Cumulative Effects Assessment in USAID Mission Programs

Weston Fisher

CEA is needed for USAID overseas mission programs at the strategic level. No examples currently appear to exist where CEA has been effectively applied and there are no specific USAID regulatory requirements to do so. However, missions and their implementing partners could apply CEA together with host countries and other donors in the USAID Country Strategic Planning (CSP) process. Recommendations to USAID and other donors, especially on institutional approaches to CEA for small-scale activities, are encouraged from CEA practitioners.

Cumulative Effects of Natural Hazards with Special Reference to Landslides in the Himalayas

Ashok Pachauri

The Himalayas are the most active mountains in the world and most vulnerable to natural hazards, especially landslide and earthquakes. Since gravity plays an important role in landslide generation, the rugged terrain is a natural depository of landslides. The landslides have been modifying landscapes in the Himalayas since the Pleistocene glaciation period. The cumulative effects of these are seen in the accumulation of landslide debris on various slopes. The article discusses possible terrain features for cumulative storage.

THURSDAY, 6 NOVEMBER

15.30-17.00

Contributing to Healthy and Productive Aquatic Ecosystems: Strengthening Institutions, Science and Practice for Regulating the Impacts of Human Activities to Fish and Fish Habitat

DFO-Sponsored Theme Forum | Organizers and Moderators: Patrice LeBlanc and Neil Fisher | Bonavista

Working Towards a National Capacity for Integrated Management

Ruth Waldick

The ability of decision-makers to assess and manage the effects of individual decisions is challenged by existing governance/institutional approaches. At any scale, two key challenges are the partitioning of decision-making along jurisdictional/sectoral lines and division of information along disciplinary/jurisdictional lines. I present a model for facilitative governance being testing in Canada, with focus on necessary mechanisms to (i) support interagency knowledge/information exchange; (ii) enable science/information specialists to directly support regionally-based decision-makers.

Habitat Pathways of Effects (PoEs): A Tool for Assessing Cumulative Effects

Mike Stoneman

Fisheries and Oceans Canada's Habitat Management Program has developed a Risk Management Framework that guides the assessment and management of impacts of works and undertakings to fish and fish habitat as part of regulatory reviews under the Fisheries Act. A series of Pathways of Effect diagrams were developed, each linking a specific activity to a number of end effects by way of identified stressors. By expanding the scale, these tools can also be refined for use in assessing cumulative effects.

Characterizing Cumulative Effect from an Integrated Resource Planning Perspective

Roland Cormier

Project level regulatory and environmental assessment processes typically assess and ascertain potential impacts of one project or human activity to a specific habitat or species within an aquatic ecosystem. By design, the scope of such assessments seldom considers the other myriad of human activities that may impact the same habitat or species. Cumulative effects or impacts are the result of the sum of activities occurring within their legal and policy frameworks. We propose a framework to identify multiple pathways of effects and characterizing the risks within the scope of an ecosystem unit.

Integrated Oceans Management and Ecosystem Approaches

Darren Williams, Robert Siron

Through its Canada's Oceans Strategy, the Government of Canada committed to taking an integrated management (IM) approach to managing human activities in oceans and protecting the most important marine ecosystems. As management of human activities needs to be done in a risk-management context, an Ecosystem-Based Management (EBM) framework was developed to identify ecologically significant components of marine ecosystems that require special attention or management measures. "Pathways-of-Effects" models are developed to assess cumulative impacts of the most impacting activities in oceans. All this information will be then considered in Regional Environmental Assessments conducted to inform the IM planning.

CEA of Oil and Gas Development on Alaska's North Slope

Theme Forum | Organizer and Moderator: Jon Isaacs | Belaire

Institutional Challenges in Managing the Cumulative Impacts of North Slope Oil and Gas Development

Jon Isaacs, Joan Kluwe

In 2003, the National Research Council concluded that there was no comprehensive assessment of the cumulative effects of North Slope oil and gas development. Stakeholders are conscientiously addressing cumulative impacts. Potential solutions include 1) an updated database of past, present, and reasonably foreseeable future effects for consistent impact assessment, 2) common standards and thresholds to assess impacts, 3) agreement/funding commitment on topical and geographic areas for baseline research, and 4) effective monitoring programs for adaptive management of cumulative impacts.

Perspective on Cumulative Effects of Oil and Gas Development from North Slope Residents

Johnny Aiken, Jon Isaacs

The North Slope Borough's predominantly Inupiat Eskimo population lives in eight far-flung communities. Indigenous culture relies on the land and sea; subsistence activities revolve around whaling, hunting, fishing, and trapping. Benefits from development include improved infrastructure; business opportunities for Native corporations, and local jobs and revenue. Oilfield development has impacted access to traditional subsistence use areas; concerns are growing regarding human health and cultural welfare. Additional cumulative effects research is needed to understand and mitigate potential impacts.

Environmental Effects of Beaufort Sea Causeways: Revisited

Joseph Colonell

In the 1980s, two gravel-fill causeways were constructed into the nearshore Beaufort Sea to support North Slope oilfields. Regulators feared 1) causeways would obstruct alongshore movements of anadromous fish, 2) causeway-induced alterations of local hydrography would be detrimental to fish habitat, and 3) interaction of causeways would exacerbate these impacts. Industry-supported monitoring concluded that causeways had no population-level effects on anadromous species. A National Academy of Sciences 2003 study of North Slope oilfields cumulative effects concurred.

Development of an Integrated Impact Assessment Model for Oil and Gas Production in a Sensitive Arctic Environment

Bruce St. Pierre

ConocoPhillips recently completed an Integrated Impact Assessment Model to study impacts related to proposed oil and gas production activities in the National Petroleum Reserve–Alaska. A computer simulation model was developed to predict, combine, and compare economic, environmental, and health and safety impacts related to construction, drilling and operations for a number of different development scenarios including construction of a permanent road from a neighboring oil field and two roadless options using only seasonal ice roads and air transport.

Sector-Based SEA and CEA

Session | Moderator: Charlotte Bingham | Mayfair

Oil and Gas Developments (Part 2)

Offshore Sediment Monitoring in Cabinda, Angola

Bomba Basika Sangolay, Lia Sousa Neto, Bjorn Serigstad, Gisle Vassenden

Offshore oil industry and fisheries are among the most important industries in Angola. To avoid conflicts between the different users of the sea, the authorities in Angola have created a monitoring plan called "Environmental Monitoring of the Petroleum Activities on the Angolan Continental Shelf." This plan is based on the Norwegian and OSPAR guidelines. In 2006 three oil fields operated by Chevron were investigated in a training program for Angolan scientists. Results from this survey will be presented.

Offshore Sediment Monitoring for Petroleum Activities on the Norwegian Shelf

Gisle Vassenden, Ingunn Nilsen

The offshore regional monitoring programme for petroleum activities on the Norwegian continental shelf began in 1996. The regional monitoring approach replaced the single field approach which has been applied since the early 1980s. The goal of the regional monitoring program is to assess potential impacts and provide information to the industry and management authorities. This presentation is based on experiences from the monitoring programme and is illustrated by result from an oilfield in the North Sea.

The Role of Strategic Environmental Assessment in the Oil and Gas Sector in Uganda

Arnold Waiswa Ayazika

Oil exploration and development activities are a new phenomenon in Uganda and are likely to have significant impacts, and effective assessment and mitigation needs a thorough understanding of operations and hazards. Knowledge about strategic environmental assessment in Uganda is still limited and therefore traditional EIA is being carried out for every potential location even with those with similar baseline information. This approach leads to a waste of time and doesn't provide information on the cumulative impacts of these activities.

Management of Cumulative Impacts and Associated Business Risks: An Example from the Oil and Gas Industry

Atma Khalsa, Dean Slocum

Recognizing that cumulative impacts are a business risk, the oil and gas industry has recently attempted to integrate CEA into their Environmental, Social and Health Impact Assessment and Risk Assessment procedures. As one of the main shortcomings of CEA is the lack of tools, methods and mechanisms for evaluating these impacts, this paper will describe examples of how oil and gas companies are addressing these concerns and will highlight some of the main challenges they have faced.

Environmental Sustainability and CEA

Theme Forum | Organizer and Moderator: Robin Senner | Britannia

On Building Environmental Sustainability Assurance into Cumulative Effects Assessment

Barry Sadler

Environmental sustainability means the impact of our development activities must stay within the regenerative (source) and assimilative (sink) capacities of natural systems and not persistently exceed or degrade them. These thresholds are poorly understood at all spatial scales and the potential changes in ecosystem structure and function associated with cumulative effects cannot be predicted with any confidence. In light of present trends, the incorporation of risk-based, precautionary and compensatory measures into environmental assessment and management seems a prudent response. This paper argues the case for this approach and identifies elements and protocols that can build increased sustainability assurance into development decision-making.

Assessing the Sustainability of Project Alternatives

Robert Senner

Evaluating and comparing development alternatives with respect to sustainability is an important goal for comprehensive project assessment. This component has been largely missing from standard environmental impact assessment (EIA) practice. To succeed, any procedure to incorporate sustainability into EIA must be convenient, fast, and inexpensive. Cumulative effects assessment provides an efficient and systematic way to incorporate sustainability metrics and predictors that have already been developed as criteria for rating systems and evaluation programs increasingly applied to buildings, communities, and infrastructure.

Environmental Sustainability as the Basis for Cumulative Effects Management: A Case Study

Tom Swor

Multiple strategies aided the incorporation of management within a CEA study for the Ohio River mainstem. The most significant development was VEC-specific matrices of "Reasonably Foreseeable Future Actions"; they were utilized throughout the study. Management of cumulative effects required consolidation of a large amount of information. The outcome was a three-level analysis of environmental sustainability (unsustainable, marginally sustainable, and sustainable) addressing past, current, and future conditions. The resultant conditions served as the foundation for identifying appropriate management measures.

The Potential Role of Cumulative Environmental Assessment Practices in Re-Engineering Institutional and Legal Frameworks and Policies for Managing Sustainable Economic Development. The Case of Small Island Development States in the Caribbean (Trinidad and Tobago)

Wayne Huggins

This paper explores the challenge of practicing Cumulative Environmental Assessments (CEA) in the context of weak institutional and legal frameworks and policies governing Environmental Impact Assessments (EIAs). The paper describes the role of EIAs in the Development Approval process in Trinidad and Tobago. The weaknesses of the current framework and the leading role the ethical and professional CEA specialist can play in influencing environmental policy are explored.

17.30-18.00

Posters

Landscape Ecological Security and Assessment in an Urbanizing Environment

Yangfan Li

Xiamen City is under rapid urbanization progress as a strategy transformation from its original island-city to a new larger bay-area-city. RS and GIS-based methods focusing on landscape spatio-temporal change and predictive ecological early-warning will be discussed in a context of the 2003, 2006 and existing trends for change of landscape ecological safety assessment. The results that showed unsafe and rapid landscape degradation regions are in accord with the distribution of coastal industrial parks.

Wind Power Development and Reindeer Husbandry

Torgeir Isdahl, Kai Nybakk

Comprehensive plans are made for development of wind power in mid-Norway. The plans are expected to have considerable consequences for reindeer husbandry. The total impacts are dependent on which projects are realized and how they are located in proportion to each other. Just a few of the projects will be realized. In this study an effort has been made to identify the projects that together will have the least negative effect on reindeer husbandry.

Cumulative Effects Associated with Conservation Programs

John Matthew Harrington

Through technical and financial assistance, NRCS seeks to improve, enhance, and protect environmental resources on private and non-federal lands. The poster presented provides a snapshot of the beneficial cumulative effects associated with conservation programs applied as a holistic resource management plan for the same property and as a result of multiple conservation program dollars being applied to the same property or on adjacent lands.

How to Reduce Contamination Danger in the Environment from Medical Waste

Merita Kuçuku, Besnik Baraj, Silva Bino

This poster aims to show how we can protect the environment when people are conscientious of: 1) Great worth of the environment where they are living. 2) What is being destroyed today is very difficult or in some cases impossible to renovate tomorrow. 3)The clean environment will say health and culture. Television programs must show effects of waste, especially in human beings' health and in contamination of the environment.

Pathways of Effects Models: A Tool to Support Decision-Making for Integrated Oceans Management

Abdelhafid Chalabi, Martine Giangioppi

Science-based tools to support ecosystem-based management have been developed, such as defining ecologically significant areas, species and conservation objectives. A risk management process is now needed to assess and address the impacts of human activities on the ecosystem. Pathways of Effects models, which describe the cause and effects between activities and their impacts on selected endpoints, can be built at different scales to meet various needs and also to assess cumulative effects to support Integrated Oceans Management.

Exploring the Benefit of Map-Based Approaches to Inform Cumulative Effects Assessment

Candace Anderson, Jessica Pratt, Humayun Sharif, Tim Smith, Valancy Reynolds

As part of our role to promote and conduct research on environmental assessment and promote sound environmental assessment practices, the Canadian Environmental Assessment Agency is exploring the analytical and integrative potential of a Geographical Information Systems (GIS)-based application to assess cumulative effects and inform regionally-based approaches to EA. The purpose of this poster is to raise awareness of this new initiative, still in its conceptual stage, and solicit any suggestions or comments with respect to its design and development.

FRIDAY, 7 NOVEMBER

09.00-10.30

The Importance of Scoping in CEA

Session | Moderator: Robin Senner | Lake Louise

Scoping a Cumulative Impact Assessment: How Much is Enough?

John Page

Infrastructure projects are not created equal. Project features and the characteristics of their setting differ substantially from project-to-project. Thus, the scopes of cumulative impact assessments also differ substantially from project-to-project. This paper examines concepts for scoping the level-of-effort for cumulative impacts assessment from the perspectives of project purpose, activities, context, and area of influence. Application is demonstrated from the perspective of eight US transportation projects.

Making Cumulative Effects Assessment Faster and Easier

Robert Senner

Even with an increasing number of agency guidance manuals, practitioners frequently encounter problems conducting cumulative effects assessments. This paper recommends proven ways to make the process faster and easier while keeping it fully in compliance with regulatory guidance and, most important, substantive, evidence-based, and useful to the public. These include new ways of approaching public scoping and agency consultation, crafting the Affected Environment description, and structuring the Environmental Consequences analyses and discussions.

Scoping a CEA in an Evolving Legal Framework: The Case of Dam Infrastructure Within the Santiago River Watershed in Western Mexico

Javier Clausen, Sergio Contreras

In the last 50 years, several medium and large dams have been built across the Santiago River. A CEA was initiated by the University of Guadalajara and the Mexican Federal Electricity Commission, aimed to address the cumulative effects of infrastructure and induced actions on the watershed ecosystems. At scoping stage, VECs potentially affected have been identified. Adoption of appropriate indicators, participatory mechanisms and multidisciplinary approaches will be discussed as main challenges for the CEA, first of its kind in Mexico.

Using the Land Tenure System to Scope the Cumulative Impacts on Grizzly Bear Habitat in the Peace River Corridor, British Columbia

Bruce Muir

For the conservation of grizzly bears to be achieved, an integrative planning framework is required for identifying the cumulative effects of anthropogenic activities caused by the implementation of British Columbia's tenure system. Developed under the Mountain Dunne-za Planning Initiative, this framework is based on a review of the land use characteristics of tenures and the potential for adverse effects. Using GIS, the framework is applied to three community planning areas that intersect with the Peace River Corridor.

Oil Sands (Part 1)

Theme Forum | Organizer and Moderator: George Hegmann | Britannia

The Dirt on Dirty Oil: An Oil Sands Reality Check

George Hegmann

Opening remarks.

Overview of Government of Alberta Cumulative Effects Management Initiatives in the Oil Sands Region

Shannon Flint

An increasing rate of industrial growth and associated impacts on the environment in northeastern Alberta calls for implementing environmental management strategies that enable outcome achievement by effectively addressing the cumulative effects of resource development. The Government of Alberta is leading or supporting a number of place-based initiatives in the Oil Sands region focused on the development and delivery of outcomes through a cumulative effects management approach. This presentation provides a brief overview of the context, purpose, structure and linkages among these initiatives.

Not Significant: The Residual Effect of Oil Sands CEAs

Terry Antoniuk

The scope of conventional oil sands cumulative effects assessments has been limited by precedent and practice. As a result, routine design, mitigation, and compensation measures do not prevent progressive degradation of social and environmental systems over the long-term. Pre-defined management objectives, including explicit targets or thresholds are required to avoid these unintended and undesirable consequences. These will require scientific and local knowledge to inform social decisions on appropriate trade-offs. Computer simulation tools provide a mechanism to incorporate available knowledge and inform decision makers about likely benefits and costs of different management targets or approaches.

Opportunities to Leverage Regional Strategic Environmental Assessment in the Oil Sands

Peter Koning

Forecasts for oil sands development range from peaks of 4 MM b/d to 6.5 MM b/d. The number of project applications will rise correspondingly. The current regulatory environment requires the preparation of a comprehensive Environmental Impact Assessment, with approval processes including consultation taking up to 4 years to complete. With the projects currently moving through the approval process, there is abundant duplication of information, particularly related to cumulative effects assessment. Opportunities exist for system improvements that leverage regional strategic environmental assessment. Such improvements would yield efficiencies for industry, government and stakeholders. An industry perspective on the current system will be provided along with a perspective on the possible efficiencies of moving to an alternate approach.

Sector-Based SEA and CEA

Session | Moderator: Charlotte Bingham | Mayfair

Other Energy-Based Developments

Managing the Reduction of Environmental Impact of Coal Use Towards Sustainability

Leszek Preisner, Tadeusz Pindor

Coal is still one of the main primary energy sources on a world scale. Industrial production of hydrogen using different methods requires an energy supply, which comes from coal and the burning of other fuels. This means that fossil fuels will be used. The rapid growth in prices of crude oil and natural gas has meant that liquid fuels produced from coal has received new attention. A particular growth of interest in this respect appears in countries that posses large coal mineral resources, but have no sufficient crude oil reserves.

CEA Case Study: Peru LNG Project

Masud Hasan, Stephen Parsons

The ESIA for the Peru LNG Projects (PLNG) did not fully address potential cumulative environmental and social effects. A CEA was prepared to ensure that the incremental effects resulting from the combined influences of the PLNG are considered in conjunction with the effects of other projects currently operating or proposed for the general area, recognizing that these incremental effects may be significant even though the effects of each activity, when independently assessed, may be considered small or insignificant.

Cumulative Effects and Health and Productive Aquatic Ecosystems (Workshop-Part 1)

DFO-Sponsored Workshop | Facilitators Larry Canter, Bill Ross, Barry Sadler | Bonavista

Participants in this workshop will discuss the results of Thursday's DFO-sponsored theme forum on contributing to healthy and productive ecosystems and make recommendations on short- and long-term actions required to advance priority issues. Participants will develop a set of regulations required to improve the assessment and management of cumulative effects. Part one of the workshop sets the stage for the workshop, including keynote presentations and explanation of the workshop and format of the breakout groups.

FRIDAY, 7 NOVEMBER

11.00-12.30

A Toolkit of Emerging Methods for CEA

Theme Forum | Organizer and Moderator: Larry Canter | Mayfair

Conceptual Models, Matrices, and Adaptive Management

Larry Canter

CEA can be aided by the use of an expanded set of methods. Three examples include conceptual models, modified interaction matrices, and adaptive management (AM) processes. Conceptual models range from summarized scientific knowledge to graphical depictions of environmental resources, their interrelationships, and potential changes resulting from multiple actions and stressors. Modified matrices can be used to address connections between proposed actions, other actions and identified VECs. Finally, AM can be used to reduce uncertainties and inform the science of CEA.

Landscape Evaluation: A Strategic Tool for the Cumulative Impacts Identification and Valuation

Beatriz Silva-Torres, Miguel Castillo-González

The landscape shows the expression of different attributes from the sites that are studied. Considering the ecological status, the environmental components that have been modified and the degree of human intervention, the result is expressed as accumulated impacts, obtaining a base line that allows us to decide the pertinence of accepting new activities. This paper shows the methodology used for the evaluation of the cumulative impacts, using landscape evaluation as a tool.

Using Measures of Landscape Fragmentation for Cumulative Effects Assessment

Jochen A.G. Jaeger

The effective mesh size method (Jaeger 2000, *Landscape Ecology*) is currently applied in Switzerland and Germany in monitoring systems for sustainable development for the indicator "landscape fragmentation." The German Federal Environment Agency has suggested introducing region-specific limits based on the effective mesh size method to control landscape fragmentation. Using this method, newly-planned transportation infrastructure can be balanced with the removal of existing infrastructure to not increase the overall cumulative impact.

People Matter: Integrating Meaningful Social and Cultural Measures in Cumulative Effects Assessment and Management

Ross Mitchell, Bethany Beale, Mitchell Goodjohn, Linda Havers, Helen Evans

Cumulative effects assessment (CEA) and management could be improved by considering meaningful but oft-neglected concepts such as "social capital" and "cultural capital." Social capital is influenced by factors such as diverse inclusive networks and volunteerism levels, whereas cultural capital consists of the values, history, transitions and behaviors that link a group of people together. After reviewing how these qualitative forms of capital are measured, innovative approaches are discussed for their strategic incorporation for CEA and management.

Assessing the Incremental Effects of Mt. Milligan Project Related Activities on the Region to be Affected by the Mountain Pine Beetle Epidemic

Ly-Shu Ramos, Bruce Ott, Sandra Baker

The Mt. Milligan Project is introduced, including methods used for assessing cumulative effects associated with the project, results of the assessment and potential benefits and future collaborative activities between Mt. Milligan environmental management efforts and regional forest management efforts. An overview on the region not already affected by the mountain pine beetle epidemic is presented with or without the project. The cumulative effects of the project are compared to the effects of logging of forests damaged by the mountain pine beetle.

Oil Sands (Part 2)

Theme Forum | Organizer and Moderator: George Hegmann | Britannia

Solving the Problem: Cumulative Solutions for the Oil Sands' Cumulative Effects

George Hegmann
Opening remarks.

Outcome Delivery Options in the Oil Sands Region

Shannon Flint
Effectively managing the cumulative effects of natural resource development on the environment in the Oil Sands region requires the use of an innovative suite of regulatory and non-regulatory outcome delivery tools. This presentation provides an overview of the delivery options currently in place or under consideration by the Government of Alberta and its partners. The presentation will suggest decision criteria that can be used to support choosing delivery tools, and the potential benefits and implementation issues associated with the options.

Establishing Management Objectives

Terry Antoniuk
Two case studies that used the approach described in the presentation "Not Significant: The Residual Effect of Oil Sands CEAs" in the previous session will be described.

A Regional Strategic Assessment of Terrestrial Ecosystems in the Oil Sands by CEMA

Peter Koning
CEMA, a large multi-stakeholder organization charged with developing recommendations to the government on how to manage cumulative effects to air, land and water within the RMWB, completed a framework for the management of cumulative effects on terrestrial ecosystems for the oil sands region in June 2008. The development of this framework was supported by strategic modeling that involved forecasting development 100 years into the future, testing key assumptions and evaluating strategic land management options in relation to key indicators. An overview of the methodology for the assessments will be described, along with the development forecasts and management option scenarios. Highlights of the results and key learnings will be presented.

Selected CEA Best Practices

Session | Moderator: Bill Ross | Lake Louise

Lessons Learned from Recent US NEPA Cumulative Impacts Case Law

Michael Smith
This presentation will focus on practical steps EIA practitioners can take to prepare their cumulative impact analyses in a manner that takes into account recent court decisions. A review of recent cases challenging the cumulative impact analyses contained in US NEPA documents will focus on key practical steps that practitioners can take to prepare more legally-defensible analyses.

A Profound Misunderstanding: Current Practice vs. Best Practice in US CEA

Leslie Wildesen
Current practice in US CEA is hampered because most practitioners misunderstand the purpose, concepts, values, outcomes, tools and methods of CEA, and because of the fragmented and contradictory nature of CEA guidance. Best practice approaches to improvement include more training, sector guidelines, regional baselines, access to centralized databases, integration with environmental management systems, and emphasis on sustainability.

FRIDAY, 7 NOVEMBER

Considering Past Projects and Effects in Cumulative Effects Assessment (CEA): Requirements, Challenges and Approaches

Steve J. Bonnell, Jeffrey L. Barnes

CEA often requires consideration of a Project's environmental effects in combination with past, present and future developments. Considering past effects and defining an appropriate temporal boundary is often a key challenge, and has resulted in uncertainty and inconsistency in CEA–including at times an expectation that a pre-development, "pristine" environment forms the baseline. This paper discusses experiences and challenges in considering past projects and effects, and explores approaches to doing so in a more practical and meaningful manner.

Cumulative Effects and Health and Productive Aquatic Ecosystems (Workshop-Part 2)

DFO-Sponsored Workshop | Facilitators Larry Canter, Bill Ross, Barry Sadler | Bonavista

Participants in this workshop will discuss the results of Thursday's DFO-sponsored theme forum and make recommendations on short- and long-term actions required to advance priority issues. Participants will develop a set of regulations required to improve the assessment and management of cumulative effects. Part two of the workshop consists of breakout sessions to discuss a set of questions around the objectives and provide feedback and recommendations.

13.30-15.00

A Tool Kit of Emerging Methods for CEA

Theme Forum | Organizer and Moderator: Larry Canter | Mayfair

Environmental Indices and Habitat Suitability Models

Larry Canter, Sam Atkinson

Multi-factor environmental indices are useful for describing baseline conditions and qualitatively predicting the cumulative consequences of multiple actions. Several case studies with indices will be briefly summarized. Habitat suitability models reflect special indices on habitat needs and quality for specific species or broad habitat types. Such models have been used to address direct and indirect effects. As to be shown from several examples, with essentially no modification, they can be also used to address cumulative effects of multiple actions.

Network Analysis in CEA, Ecosystem Services Assessment and Green Space Planning

Lourdes Cooper

Network analysis and GIS were applied in defining ecosystem services provided by green spaces using the Kent Thameside case study in a research project for the UK Department for Food and Rural Affairs. This paper discusses the application of network analysis in understanding relationships between land uses and ecosystem services and as a useful technique to engage stakeholders. Network analysis provides a means to identify key issues and assess cumulative effects in green spaces planning, Sustainability Appraisals and SEAs.

How to Estimate Cumulative Community Impacts with a Choice Modelling Approach

Galina Ivanova, John Rolfe

Cumulative environmental, social and economic impacts of various developments can be assessed using a choice modelling approach. A case study of a mining town in Queensland, Australia, shows how members of a community might value or respond to different cumulative impacts of multiple new developments. The Choice Modelling technique can be used to improve the impact assessment process and support the decision making process in addressing cumulative impacts and environmental, social and economic sustainability of local and regional communities.

Cumulative Impact Data Management

Danny Reinke, Larry Canter

Cumulative impact analysis requires the collation of data from many sources, and finding the data in large documents that are not indexed for this purpose can be difficult. In order to make the data useful for CEA practitioners, a tool that can search hundreds of documents simultaneously has been developed. The software is "Google-like" and requires little to no learning curve and is free at the user level. Development and use of the tool will be discussed and demonstrated.

Promoting Environmental Sustainability Via an Expert Elicitation Process

Tom Swor

Environmental sustainability planning was applied to the 981-mile long, commercially navigable Ohio River. Navigation improvement needs were identified along with actions to restore ecological resources to a higher state of sustainability. The actions were identified via an expert elicitation process involving aquatic and riparian/terrestrial experts. The received information was synthesized into goals for resources, actions to attain the goals, and monitoring to evaluate conditions. Finally, 26 types of environmental sustainability actions were identified and considered along with navigation improvements.

Case Studies of Cumulative Effects Assessment and Management in Western and Northern Canada

Theme Forum | Organizers and Moderators: Lorraine Seale, Alan Erlich, Graham Seagel | Britannia

The NWT Environmental Stewardship Framework

David Livingstone

Concern about the potential cumulative effects of development in the Northwest Territories (NWT) has catalyzed the development and implementation of a broad environmental stewardship framework that establishes a context for responsible economic development in the NWT. The framework has five broad components: vision; planning and environmental programs; assessment, regulation and enforcement; administration; and audit and reporting. Most components are entrenched in land claims-based legislation. The remaining programs and activities are largely policy and mandate-based.

Managing Cumulative Effects of Oil and Gas Development in Northeast British Columbia: Preparing for the Boom

George Hegmann

The BC Oil and Gas Commission (OGC) and the Muskwa-Kechika Management Board (MKMB) supported research into how to manage cumulative effects of pending large-scale oil and gas development in northeast British Columbia, Canada. This vast region has a substantial natural gas opportunity, a major natural area referred to as the "Serengeti of North America" for its still-large populations of ungulates and carnivores, and is an area of traditional use by many aboriginals. This presentation describes various solutions developed to manage the burgeoning influx of exploration and production.

A Strategic Assessment Approach to Oil and Gas Rights Management in the Beaufort Sea, NWT (Part One)

Tom Duncan, Jess Dunford, Paul Fraser, Heidi Klein, Mieke Vander Valk

Indian and Northern Affairs Canada (INAC) required a tool for supporting oil and gas rights issuance activity in the Beaufort Sea. Interest in Beaufort oil and gas raised the need for a strategic approach to its assessment. The tool needed to have an integrated framework: environmental, social and economic. Aboriginal groups, industry, government and non-government organizations were involved in the development. INAC undertook development of a GIS-based Decision Support Tool (DST) in order to meet these requirements.

A Strategic Assessment Approach to Oil and Gas Rights Management in the Beaufort Sea, NWT (Part Two)

Heidi Klein, Jess Dunford, Paul Fraser, Tom Duncan

A GIS-based decision support tool (DST) was developed to facilitate decisions related to oil and gas exploration in the Beaufort Sea. The tool identifies regions of high, medium or low probability for exploration while flagging those areas of least to greatest environmental sensitivity. Its intended future use includes identifying areas, which may be sensitive to cumulative changes. This paper will discuss the development of the DST and its potential use for strategic planning and cumulative effects management.

Cumulative Environmental Effects Assessment for the Mackenzie Gas Project: Lessons Learned

Alan Kennedy

The Mackenzie Gas Project (MGP) comprises three natural gas production fields, a gas gathering system, and a 1,300 Km. pipeline from Inuvik NWT to Alberta. The cumulative environmental effects assessment (CEA) included scoping of temporal and spacial elements, baseline evaluation, comparison of future oil and gas exploration and development scenarios. The paper discusses study boundaries, future development scenarios, reasonably foreseeable activities, and resource threshold evaluation. The paper will provide lessons learned and will contribute to CEA best practice.

FRIDAY, 7 NOVEMBER

Climate Change and SEA

Session | Moderator: Ray Clark | Lake Louise

Climate Change: The Ultimate Cumulative Impact?

Michael Smith

Climate change has recently emerged as an important topic in EIA. In the United States, analysis of climate change impacts in NEPA documents is a fairly recent development. Many NEPA documents today contain no such analysis. This presentation will review the current status of litigation related to climate change and NEPA, and discuss examples of early attempts to address climate change in NEPA documents.

Influences and Effects of Climate Change on CEA

Ray Clark

Climate change will have multiple effects on the environment, economy, national security, agriculture, trade and commerce. In November 2007, the Ninth Circuit ruled that the National Highway Traffic Safety Administration must prepare an EIS to assess greenhouse gas emissions attributable to new automobile fuel efficiency standards. Accordingly, policy and science implications for federal agencies addressing environmental and other effects will be summarized, as well as the consequences of emerging legislation and analytical expectations of the courts, Congress and public.

Role of CEA in Addressing Climate Change

Norval Collins

The need to incorporate climate change into the EIA process is becoming more urgent, but a number of road blocks are identified. The potential for CEA to play a critical initial role is made based on minimal change to the overall process, simpler guidelines, and ease of regulatory buy-in. The pros and cons of using CEA to further incorporation of climate change in the EIA process are identified, with experience drawn from the IAIA climate change list serve.

Climate-Biodiversity Interactions: Assessment of the Effects of Climate Variability on Biodiversity Conservation in Relation to Communities' Livelihoods in Lake Manyara Sub-Basin

Madaka Tumbo, Emilian Kihwele

Shifts in the extremes of climatic parameters such as temperature and moisture will have impacts on biodiversity, although it is difficult to predict to what extent because the ability of many species or ecosystems to respond to change in climatic extremes is unknown. Mitigation and adaptation is urgently required to reduce climate change impacts on biodiversity. Many of the people most vulnerable to climate change and its impacts are also those that are most dependent on biodiversity.

Cumulative Effects and Health and Productive Aquatic Ecosystems (Workshop-Part 3)

DFO-Sponsored Workshop | Facilitators Larry Canter, Bill Ross, Barry Sadler | Bonavista

Participants in this workshop will discuss the results of Thursday's DFO-sponsored theme forum on contributing to health and productive ecosystems and make recommendations on short- and long-term actions required to advance priority issues. Participants will develop a set of regulations required to improve the assessment and management of cumulative effects. Part three of the workshop continues discussion around the objectives with feedback and recommendations.

15.30-17.00

CEA Toolkit 2: Use of GIS

Theme Forum | Organizer and Moderator: Sam Atkinson | Mayfair

Multiple Uses of Geographic Information Systems (GIS) in CEA

Sam Atkinson, Larry Canter

Due to spatial and temporal considerations in CEA, GIS can be a useful tool within such studies. The uses can range from addressing temporal land use changes to describing declines or recoveries of habitat types in the study area. GIS information can also be used in predictive modeling of historical, current, and future cumulative effects. Further, such GIS information can be used in planning local mitigation and regional management programs. Case studies illustrating these uses will be described.

CEA GIS Tool for Managing Scoping Processes in Public Institutions

Giuseppe Magro, Cesare Bertocchi, Anna Gozzi

The paper is on a relevant institutional case study of supporting CEA analysis and evaluation into new public authorization procedure. An important Italian Province for waste plants and dredging facilities improved an innovative and integrated software system assessing cumulative impacts of new authorizations. It is a GIS-based tool calculating cumulative impacts considering size, stressor frame typology, environmental vulnerability frame of each new potential development and produces cumulative indexes by which is possible to plan site specific mitigation and compensation actions.

CEA-GIS Based Automatic Tool for Selection of Gas Pipeline Corridors

Denise Ferreira de Matos, Paulo Cesar Pires Menezes, Cristiane Barbosa Cruz, Katia Cristina Garcia, Jorge Machado Damazio, Alexandre Mollica Medeiros

This paper describes a CEA-GIS based automatic tool for construction of cost-distance grids to help the selection of alternative corridors for gas pipelines planning expansion. The tool, constructed with spatial analysis functions, is based in a theoretical methodology that evaluates and selects the corridor alternatives that present, at the same time, the minimum cumulative environmental impacts, and social-economic or constructive issues, thereby contributing to the decision-making process.

An Operative GIS-Based Methodology for Quantifying Impacts of Past, Present and Future Cumulative Actions of Projects

Giuseppe Magro, Stefania Pellegrini, Federico Pelizzari

A general operative and systematic framework assessing different cumulative impacts of actions is the main topic of this work. The methodology considers past, present and future impacts in a quantitative way. Each stressor element is here characterized by dynamic space-time indicators driven from physical based models and a computational GIS tool produces cumulative impact matrixes for specific stressor-vulnerability interaction. The methodology is relevant for CEA characterized by heterogeneous and multiple stressor acting on critical and impacted areas.

Case Studies of Cumulative Effects Assessment and Management in Western and Northern Canada

Theme Forum | Organizers and Moderators: Lorraine Seale, Alan Erlich, Graham Seagel | Britannia

Cumulative Environmental Effects Management of Uranium Mining in Northern Saskatchewan Using GIS

Robert Moroz

The potential for cumulative effects in Northern Saskatchewan is rising as the region experiences increased industrial activity, primarily from uranium exploration and mining development. In response, Cameco Corporation is developing new approaches for quantitatively assessing cumulative impacts. Baseline and operational environmental monitoring programs provide direct information for use in assessments, but are spatially limited. To address these limitations, surrogate environmental indicator information is being integrated with environmental monitoring data using GIS to identify areas for further evaluation and assessment.

Terms of Reference for Caribou Impact Assessment and Monitoring

Stephen Lines

Based on my review of terms of reference (guidelines) for environmental impact statements, I find that proponents would benefit from clear direction concerning what factors to consider when assessing impacts on caribou. The approach taken to develop the guidelines is an ecosystemic approach, meaning that information concerning both natural and human factors influencing caribou populations are required to predict and verify development impacts on caribou. Implementing the guidelines requires a cumulative and collaborative approach to caribou impact assessment and monitoring.

Rejection on Cultural Grounds: Cumulative Cultural Effects and RFFDs in the Upper Thelon River Basin

Alan Ehrlich

The Mackenzie Valley Environmental Impact Review Board recently rejected four proposed uranium exploration developments in the Upper Thelon River basin, based on the cultural importance of the Upper Thelon basin. Cumulative effects were important considerations in these EIAs. This talk will use case studies to explore the relevance of scale in impacts of a spiritual nature, EIA as a driver land use planning and the application of reason in considering foreseeable developments.

Does Study Area Affect a CEA Outcome?

Tobin Seagel

Cumulative effects assessments are only as meaningful as the data and assumptions they are built from. Good design is critical. This paper explores how much the choice of the size of a study area impacts the outcome of a CEA. A case study of Plutonic Power's Green Power Corridor, 24 potential run-of-river hydropower projects in coastal British Columbia, guides the discussion.

National Experience with CEA

Session | Moderator: Leslie Wildesen | Lake Louise

Policy and Practice Variability for Cumulative Effects Assessment in Western Australia

Angus Morrison-Saunders

Although environmental impact assessment (EIA) procedures in Western Australia have been internationally acclaimed, the policy and practice of cumulative effects assessment (CEA) is highly variable. All EIAs are meant to consider CEA but practice is patchy. Quantified cumulative loss thresholds in recent EIA guidance documents along with offset requirements offer promise for great improvement in CEA. Drawing on policy and practice examples this paper will attempt to understand the situation with reference to experience elsewhere in the world.

Assessment of Cumulative Effects in Mexico

Angeles Mendoza Sammet

Cumulative Effects (CE) are evaluated in Mexico only for projects or activities belonging to the regional modality. Reports submitted for approval to the Secretariat of the Environment and Natural Resources (SEMARNAT) are examined to determine whether the review process is effective to evaluate CE and the adequacy of mitigation measures. Changes to the environmental legislation and the review process are recommended to improve the effectiveness of the EIA process and practice in Mexico.

Beyond Cumulative Effects: The Future of the Future

George Hegmann, Tony Yarranton

The certainty of substantial future hydrocarbon development in Canada's west and arctic is contrasted against uncertainty in details of what and where those developments, and their environmental response, may be. The future of a meaningful cumulative assessment of these changes is found within an understanding of how science, the will of government, perception of risk and global energy demand collectively shape the future, creating a context within which energy development may continue but with management effective and compromises clear.

Assessment of Cumulative Impacts in Sweden: Could There Be Light at the End of the Tunnel?

Charlotta Faith-Ell, Bengt Eriksson

Previous studies have shown that the practice of assessing cumulative impacts in Swedish EIA has been almost non-existent. However, recent court rulings regarding tunneling projects indicate clearer guidance from government. This paper builds on a study of the City Tunnel project and the City Line project. The aim is to give an introduction to the current situation, an analysis of the court rulings and a discussion of the potential implications on the future practice in Sweden.

Cumulative Effects and Health and Productive Aquatic Ecosystems (Workshop-Part 4)

DFO-Sponsored Workshop | Facilitators Larry Canter, Bill Ross, Barry Sadler | Bonavista

Participants in this workshop will discuss the results of Thursday's DFO-sponsored theme forum on contributing to healthy and productive ecosystems and make recommendations on short- and long-term actions required to advance priority issues. Participants will develop a set of regulations required to improve the assessment and management of cumulative effects. Part four of the workshop is a wrap-up plenary to report on the results of the breakout sessions and concluding remarks.

Notes

THEME FORUMS AND SESSIONS

SATURDAY, 8 NOVEMBER

09.00-10.30

Plenary: Improving the Way Cumulative Effects are Assessed and Managed: Future Directions

Moderator: Larry Canter | Britannia / Belaire / Mayfair

Perspective of the Canadian Environmental Assessment Agency

Peter Sylvester

Breaking the Cycle: Avoiding Cumulative Effects Under Australia's Federal Environment Legislation

Peter Burnett

Recent amendments to Australia's federal environment legislation have increased the capacity of decision-makers to avoid the cumulative effects of development decisions, which in Australia are often made across several levels of government. Provisions of the federal Environment Protection & Biodiversity Conservation Act 1999 provide for collaborative strategic planning; and the assessment and approval of policies, plans and programs across regions, ecological communities or species. Supported by policies aimed at greater engagement with stakeholders, these provisions present real opportunities for proactive regional biodiversity and environment protection outcomes.

An Industry Perspective on Improving Cumulative Effects Management

Brenda Kenny

An International Bank Perspective on Improving Cumulative Effects Assessment

Janine Ferretti

11.00-12.30

CEA Toolkit 2: Use of GIS

Theme Forum | Moderator: Sam Atkinson | Mayfair

Aquatic Habitat Modeling Via Watershed Data Using GIS Modeling

Samuel Atkinson, James Kennedy, Jamie Slye, David Johnson, Barney Venables

The Trinity River flows through the Dallas-Fort Worth metropolitan area, Texas, USA, providing an opportunity to examine the effect of urbanizing watersheds on aquatic habitat quality. This river has a high wastewater treatment plant effluent to river flow ratio during late summer months, which may provide insights into the cumulative effects of watershed development on the rivers of semi-arid regions. This paper provides evidence that aquatic habitat characteristics can be predicted based on easily accessible watershed characteristics.

Habitat Equivalency Analysis GIS Tool (HEA-DCGIS) for Calculating Ecological Restoration and Rehabilitation of a Cumulative Impact Frame of Actions

Giuseppe Magro, Stefano Scarpanti, Stefania Pellegrini

HEA is N.O.A.A. methodology determining compensation for environmental resource injuries. A Dynamic Computational GIS tool (DCGIS) is here improved for spatial application of HEA estimating cumulative impacts on ecological resources and to determine appropriate level of compensation. Ecological damages are characterized in terms of indicators by which it is possible to plan a service-to-service compensatory restoration. The HEA-DCGIS tool methodology is powerful for assessing cumulative environmental impacts generated by different actions.

Enhancing Cumulative Effects Assessment in Canada: A GIS-Based Tool for Federal Project Identification

Joseph Ronzio, Nick Sanders

A GIS-based tool for informing cumulative effects assessment was developed using data from the Canadian Environmental Assessment Registry. The results of the study demonstrated that the Registry is a rich source of data best suited to issues scoping, large-scale conservation or land use planning, and predicting cumulative effects on a regional and project-specific level. The available data is useful for planning CEAs and the authors provide insight on modifications that could improve the decision-support capability.

Evaluation of Cumulative and Synergistic Impacts in the Hydropower River Basin Inventory Studies (HRBIS)

Denise Matos, Silvia Helena Pires, Paulo César Menezes, Daniel Oliveira, Luciana Paz, Katia Garcia

The HRBIS aims to select the best alternative for the river basin head division scheme of a hydropower project, considering the energetic, economical and socioenvironmental aspects. This paper presents the methodology developed to incorporate the socioenvironmental analysis together with the other dimensions, under a multi-objective focus. It emphasizes the procedures for the evaluation of the cumulative and synergistic impacts of the group of hydropower projects in the different stages of the studies, as well as the correspondent indicators.

Regional-Level SEA

Theme Forum | Moderator: Barry Sadler | Britannia

Introduction to Theme Forum: On SEA Application to Address Cumulative Effects: What is the Value Added by a Regional Approach?

Barry Sadler

By definition, SEA is far better equipped than project-level EIA to address cumulative effects. In practice, experience with SEA use internationally suggests that this approach has fallen short of initial expectations as a means of identifying and managing cumulative effects. Regional-level SEA, already applied in certain jurisdictions, is being considered in Canada as a better way of dealing with these effects at appropriate spatial scales. The value added to planning and decision-making can be variously itemized, but arguably will be commensurate with the overall correspondence of REA to an ecosystem-based approach, i.e., which evaluates (however imperfectly) the significance of cumulative effects against a framework of conservation objectives and criteria.

Alberta's Cumulative Effects Management System

Menzie McEachern, Ian Dyson, Christine Lazaruk

The Government of Alberta is developing a new outcomes-based environmental management system. The Cumulative Effects Management System will consider the environmental implications of development for an entire region. A new approach is necessary if we intend to protect the environmental quality (air, land, water, biodiversity) of our province. This evolutionary approach will be integrated with the provincial Land-use Framework and change the way the Government of Alberta does business.

Regional Planning for Cumulative Effects Management

Dave Belyea, Dave Borutski

The Government of Alberta has developed a new land-use framework for the province. The entire framework defines and supports an outcomes-based, adaptive management approach. A key strategy is development of six integrated regional plans covering the province. The planning process and its relationship to Regional Strategic Environmental Assessment and to cumulative effects management will be described, with the leading case examples.

Regional Strategic Environmental Assessment in Alberta

Dallas Johnson, John Kenney, Menzie McEachern, Gustavo Mendoza, Andrew Buffin

Alberta Environment will present a conceptual framework for Regional Strategic Environmental Assessment (RSEA). The presentation will explore the potential utility of RSEA as a planning tool within the context of Alberta's shift to a cumulative effects management system.

SATURDAY, 8 NOVEMBER

The Future Directions of Cumulative Effects: Making It Happen (Part 1)

Theme Forum/Workshop | Organizers and Moderators: Doug Marteinson, Joseph Wells, Miles Scott-Brown | Bonavista

This theme forum workshop will be characterized by high participation, collaborative dialogue and strategic networking. It aims to maximize conference integration and synthesis and will be of particular interest to CEAM practitioners who want to discuss innovative but practical ways forward. The workshop will utilize Open Space Technology, a format that draws on the wisdom in the room and gives all participants the opportunity to put their most burning issue respecting cumulative effects on the table. Participation will be limited to 40 people (see sign-up sheet posted on the message board).

This workshop will focus on such questions as:

- How can we best apply our EIA and SEA tools to cumulative effects management?
- What changes are needed to make the current regulatory approach to cumulative effects management more effective?
- How will we bring all parties to the table and develop collaborative approaches to the management of cumulative effects?
- What specific tools, management frameworks, or thresholds for growth make sense for cumulative effects management?
- How can we effectively communicate these issues to stakeholders and the public at large?
- What challenges must we overcome now and in the future?

Through discussion and peer dialogue, participants may uncover breakthroughs on cumulative effects topics. The format enables integration and learning across science, institutions, operational practice, sectors and systems. Informal communities of practice may develop and expanded opportunities for continued online dialogue may emerge.

While the forum begins and ends with this large group, it will break into numerous concurrent discussion groups through the day. Key points from each discussion group will be captured, entered into computers and made available to all workshop participants on the morning of the conference on Day 4.

13.30-15.00

Regional-Level SEA

Theme Forum | Moderator: Barry Sadler | Britannia

CEA in Policies and Plans: Case Studies in the UK

Lourdes Cooper

This paper initially presents the legislative and regulatory requirements for assessing cumulative effects in plans and programmes in the UK. The two approaches for assessing plans in the UK, Sustainability Appraisal (SA) and SEA are discussed. In most cases, a combined SA and SEA process is undertaken by Local Planning Authorities. The issues, methods and findings in assessing cumulative effects within this combined approach are explored in case studies.

Integrating Cumulative Effects in Water and Spatial Planning

Barbara Carroll, Josh Fothergill, Joanne Murphy

Spatial/development plans are required to consider cumulative effects through statutory SEA/SA. Water plans consider CEA in their SEA approach. The objectives-led EU Water Framework Directive should enable integration with spatial planning SA/SEA for a more effective tool to inform decision making. The paper explores recent practical experience of addressing cumulative effects of river basin management plans and spatial plans in the UK. It investigates the extent of integration achieved and suggests mechanisms for improving effectiveness.

Re-Defining Cumulative Effects Assessment in the Context of Regionally-Based Strategic Environmental Assessment

Jill Harriman Gunn, Bram Noble

Despite common sentiment that cumulative effects assessment (CEA) in a strategic setting is "the same as" CEA in a project environmental impact assessment (EIA) setting, several features of strategic environmental assessment (SEA) alter the consideration of cumulative effects and vice versa. This paper draws on Canadian case examples of formal and informal regional and strategic EA to illustrate the specific challenges and reconsiderations that integrating CEA and R-SEA presents.

A Strategic Approach to Regional Cumulative Effects Assessment in the Great Sand Hills, Saskatchewan

Bram Noble, Brent Bitter

We report on integrated CEA-SEA experience in the Great Sand Hills (GSH), Saskatchewan. The 2007 GSH study rolled up 15 years of regional planning and provides direction for cumulative effects management and land use. The assessment required a process unlike previous efforts, and a framework that could support futures-oriented CEA. We present the GSH strategic assessment framework, discuss how such frameworks guide CEA processes at the regional scale, and offer a number of observations concerning "good" regional CEA.

The Future Directions of Cumulative Effects: Making It Happen (Part 2)

Theme Forum | Organizers and Moderators: Doug Marteinson, Joseph Wells, Miles Scott-Brown | Bonavista

See description on page 30.

Cumulative Effects Mitigation and Management at Sub-Regional Levels

Theme Forum | Organizer and Moderator: Larry Canter | Mayfair

Using Existing Environmental Management Programs

Larry Canter

An initial consideration for mitigation and cumulative effects management should focus on pollutant emissions trading programs and resource conservation and enhancement emphases. Several countries have implemented air pollutant programs, as well as water quality (pollutant) programs. Features include the use of emission caps (air) and total maximum daily loads (water). Resource programs include wetlands mitigation banking, resource offsets, and designated protection and conservation areas. Illustrations of such programs are provided, and opportunities for usage in CEA will be proposed.

Implementation of a Desert Tortoise Recovery Plan Task

Danny Reinke, Judy Hohman

The desert tortoise (DT) is a listed species in the southwestern United States. The Recovery Plan identifies raven predation as a cumulative impact parameter and control of predation as a recovery task. With U.S. FWS as the lead agency and the collaboration of agencies from the Mojave Desert Managers Group, a plan was developed and is being implemented through a multi-agency working group. The details of this collaboration and development of the project-specific task will be discussed.

Strategic Approach to Cumulative Effects: The Proposed Kimberley LNG Hub in Western Australia

Jenny Pope, Paul Gamblin

In response to increasing pressure to open up the pristine Kimberley Region for resource development, the Government of Western Australia has committed to an integrated, strategic process to identify a suitable location for a multi-user LNG hub in the region for processing gas from the Browse gas fields. The process aims to minimise the cumulative effects of LNG developments, while ensuring that unique environmental and cultural values are preserved and that social benefits, particularly for the Traditional Owners, are delivered.

SATURDAY, 8 NOVEMBER

Towards Acceptable Change: A Thresholds Approach to Manage Cumulative Effects in Southern Alberta

Peggy Holroyd

The Southern Foothills Study was launched by a group of landowners, industry, environmental groups and local governments to assess the cumulative impact of future land use in southwest Alberta. Building on the Study, this research tests a participatory, innovative approach to identify thresholds that can help to manage the cumulative effects of land use activity on valued ecosystem components. Lessons from this case study and recommendations for scenario analysis and thresholds-based management of cumulative effects are provided.

15.30-17.00

Regional-Level SEA

Theme Forum | Moderator: Barry Sadler | Britannia

The Missing Link: EIA-SEA Systems in Hydroelectric Planning

Juan Quintero

The efficiency and effectiveness of EIA systems as a tool for environmental management and long-term sustainability for the hydroelectric sector are being questioned in many countries. There have been many recent initiatives to introduce Strategic Environmental Assessment (SEA) in hydroelectric sector planning in developing nations, however, without clear linkages to EIA. A conceptual Integrated Environmental Management System for the hydroelectric sector is proposed, which links SEA and EIA through Cumulative Impact Assessment at the watershed level.

Regional Strategic Environmental Assessment (RSEA) in Oil, Gas and Petrochemical Industries in Arabian Gulf Countries

Habib Alshuwaikhat

Concern for the environment has been one of the basic responsibilities and a long-standing commitment of oil, gas and petrochemical industries. However, it has been observed that regional strategic environmental assessments (RSEA) of major projects in many Arabian Gulf countries are not part of the industries' environmental assessment practices. The main objective of this paper is to introduce the concept of RSEA. The international RSEA practices and experiences in oil and gas industries are also outlined.

Assessment of Cumulative Effects in Finnish Forest Planning Regulation

Ismo Pölönen

The presentation deals with the existing and potential use of strategic environmental assessment (SEA) in Finnish forestry planning. It focuses on the question how the assessment of cumulative environmental impacts is addressed in forest planning regulation. The context is largely regional forestry planning for private-owned forests. The paper shows that the assessment requirements on forestry planning are very general in nature and assessment documents contain only brief and often vague estimation of cumulative environmental effects. The paper also identifies the difficulties of introducing new statutory assessment duties and concludes that the new assessment requirements should be well-integrated to the existing planning system.

Method and Practice Progress of Cumulative Environmental Assessment in SEA at Planning Level in China

Wei Li,Yanju Liu

As a key technical target of SEA at planning level in China, cumulative environmental assessment (CEA) has been a challenge for the existing SEA methods and practice. Based on the SEA pilot studies organized by Ministry of Environmental Protection, the merits and limits of four CEA methods are summarized and discussed: spatial and industrial correlation analysis, retrospective analysis of development decision and environmental change, dynamic evaluation of environmental carrying capacity and similarity analysis of cause and effect relations.

The Future Directions of Cumulative Effects: Making It Happen (Part 3)

Theme Forum | Organizers and Moderators: Doug Marteinson, Joseph Wells, Miles Scott-Brown | Bonavista

See description on page 30.

Cumulative Effects Mitigation and Management at Sub-Regional Levels

Theme Forum | Organizer and Moderator: Larry Canter | Mayfair

The Use of Offsets in EIAs as a Way of Mitigating Cumulative Impacts for Major Resource Proposals in the Northwest of Western Australia

Garry Middle

The use of offsets as a way of counterbalancing impacts of proposals is an emerging tool in EIA, and can be one way of addressing cumulative impacts. This paper examines some recent major resource related proposals for the north of WA and the effectiveness of offsets in addressing impacts and the drivers for the use of offsets. The usefulness and limitations of offsets are discussed, and the key issues that are emerging within a policy context identified.

Mitigation of Cumulative Effects on Hawaiian Spinner Dolphins Through Collaborative Management

Jon Isaacs, Anne Southam

Scientists have documented behavioral changes in Hawaiian spinner dolphins due to cumulative effects of increased human activities. Shallow bays, popular for humans, are prime dolphin habitat for resting, caring for young, and avoiding predators. Swim-with-dolphin tours have also increased in popularity. NMFS is leading collaborative efforts to mitigate impacts of activities through a Spinner Dolphin Working Group and Dolphin Smart Program. NMFS hopes to minimize effects through rule making, education, and enforcement of time-area closures and monitoring programs.

Addressing Cumulative Environmental Impacts in Development Projects: Experience and Emerging Lessons at the IDB

Janine Ferretti, Elizabeth Brito

The Environment and Safeguards Compliance Policy of the Inter-American Development Bank requires that cumulative impacts be part of the range of effects and impacts examined in an environmental assessment. Among some of the key issues the IDB faces are those related to the carrying out of the assessment as well as those related to developing the strategies and actions to address the cumulative impacts identified. The presentation will address questions regarding the responsibilities of proponents and other relevant agencies.

Adaptive Management and Integrated Decision Making

Larry Canter, Sam Atkinson

Adaptive Management (AM) is being used as a follow-up to EIA/CEA studies. Typical AM processes incorporate management objectives, conceptual to quantitative models, management choices, monitoring, systematic decision making, and stakeholder collaboration. Such processes reduce cumulative effects uncertainties, and inform decision making relative to local and regional operational changes to minimize cumulative effects. Advantages and concerns regarding AM will be highlighted along with AM case studies. Particular attention will be given to multi-agency collaboration within the case studies.

THEME FORUMS AND SESSIONS

SUNDAY, 9 NOVEMBER

09.00-10.30

Traditional Calgary Pancake Breakfast

Optional; tickets may be purchased at the registration desk on Friday.

10.45-12.00

Closing Plenary: What Was Said, Where to Next?

Moderator: Charlotte Bingham | Belaire / Mayfair

Perspectives

Larry Canter, Angus Morrison-Saunders, Bill Ross, Nick Taylor, Roger Creasey

Notes

GENERAL INFORMATION

The Host City: Calgary

Heart of the Old West and the New West as well as the center of the oil and gas industry in Canada.

Allow time to explore this vibrant city, a very real example of a modern boom town that still retains the trappings of its frontier past, home to the oil and gas industry and with many local and regional examples of cumulative effects.

Calgary offers Devonian Gardens (indoor), the Glenbow Museum, the Zoo (with many indoor exhibits), Botanical Garden and Prehistoric Park, the venue of the world-famous Stampede, Fort Calgary, and Olympic Park as well as many chic dining, shopping, theatre, and ballet opportunities.

A few hours' drive will take you to Canada's most beautiful scenery: the Canadian Rocky Mountains, including Banff National Park; the dinosaur beds of Alberta's Badlands; Aboriginal history, arts and crafts; Head-Smashed-In Buffalo Jump Interpretive Centre (a UNESCO World Heritage Site), and more.

See www.tourismcalgary.com for more information.

Photos provided courtesy of Tourism Calgary.

Conference hotel

The Westin Calgary
320 4th Avenue SW.
Calgary, Alberta T2P 2S6, Canada
Phone: +1.403.266.1611.
http://www.westincalgary.com

Language used

English is the primary language used at IAIA meetings. Presenters are asked to keep presentations clear and precise and to speak slowly to accommodate those for whom English is not their first language.

Meeting attire

IAIA meetings are generally business casual.

Business services and presentation equipment

Presenters are responsible for supplying their own session or poster materials. Because of high rental costs which would necessarily be passed on to all delegates in the form of higher registration fees, IAIA does not provide copying, printing, computers or other business services on-site.

PowerPoint projectors and laptop computers are provided in each session room. Presenters should plan to load their own files on the laptops provided during the break prior to their sessions. Presenters are responsible for arranging and paying in advance for any other equipment needed for their presentations. IAIA and/or the venue will not guarantee availability of equipment for requests made on-site.

Meals

Informal light lunches will be provided by IAIA. Based on the data collected via registration forms, IAIA will estimate a percentage of vegetarian meals. This does not guarantee accommodation of individual preferences.

Proceedings

IAIA will be publishing conference papers on CD-ROM following the conference.

Passports and visas

See the Government of Canada Web site (www.cic.gc.ca/english/visit/index.asp for detailed information on required travel documents.

Insurance and liability

Neither IAIA nor the organizing committee will be responsible for medical expenses, accidents, losses or other unexpected damage to property belonging to meeting participants, either during or as a result of the meeting. Participants are advised to arrange their own insurance for health and accident, lost luggage, and trip cancellation.

Climate

November weather in Calgary can be unpredictable. The daily average temperature for Calgary in November is -3°C / 26°F, but check weather reports before departing: Calgarians may be enjoying an extended warm autumn—or shoveling snow!

Helpful Web sites

Canada Tourism
http://www.canada.travel/selectCountry.html

Calgary Tourism
http://www.tourismcalgary.com/

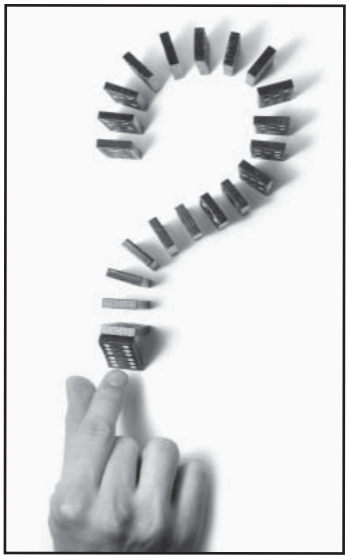
Money and Costs
http://www.lonelyplanet.com/worldguide/canada/money-and-costs

Weather
http://www.intellicast.com/local/weather.aspx?location=CAXX0054

Carbon Offset Program (Air Canada)
http://www.aircanada.com/en/travelinfo/traveller/zfp.html

Does your anxiety level rise when your project requires cumulative effects assessment or management?
This meeting is for **you** and the work you do for your organization and clients!

ASSESSING AND MANAGING CUMULATIVE ENVIRONMENTAL EFFECTS



Assessing and Managing Cumulative Environmental Effects: Science, Institutions, Practice and Integration is a special topic meeting of the **International Association for Impact Assessment**.

IAIA was organized in 1980 to bring together researchers, practitioners, and users of various types of impact assessment from all over the world.

IAIA members reside in over 100 countries. IAIA activities are carried out locally and regionally through its extensive network of Affiliates and Branches.

IAIA's Vision: IAIA is the leading global network for best practice in the use of impact assessment for informed decision making regarding policies, programs, plans, and projects.

IAIA's Mission: IAIA provides an international forum for advancing innovation and communication of best practice in all forms of impact assessment to further the development of local, regional and global capacity in impact assessment.

IAIA's Values: IAIA promotes the application of integrated and participatory approaches to impact assessment, conducted to the highest professional standards.

IAIA believes the assessment of the environmental, social, economic, cultural and health implications for proposals to be a critical contribution to sound decision-making processes, and to equitable and sustainable development.

SPONSORS

IAIA gratefully acknowledges these organizations for their support of this special meeting. By sharing their resources, these organizations demonstrate their commitment to the environment and contribute to the improvement of impact assessment worldwide.

- **Fisheries and Oceans Canada (DFO)**
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