

Monitoring / Follow-Up Annotated Bibliography

Canadian Environmental Assessment Agency
EA Enhancement and International Affairs Team

March 14, 1997

Table of Contents

About this Bibliography.....	4
Notes sur la présente bibliographie.....	5
1.0 Guide/Manuel.....	6
2.0 Background Information/Documentation.....	8
3.0 Monitoring/Surveillance.....	11
3.1 Environmental Effects/Effets environnementaux.....	11
3.2 Compliance/Conformité.....	13
3.3 Baseline/Conditions de base.....	13
3.4 Audits/Vérification.....	14
3.5 Integrated Monitoring/Surveillance intégrée.....	16
4.0 Case Studies/Études de cas.....	17
5.0 Location/Lieu.....	22
5.1 Canada.....	22
5.2 United States/États-Unis.....	24
5.3 Australia/Australie.....	25
5.4 United Kingdom/Royaume-Unis.....	25
5.5 Antarctica/Antarctique.....	26
5.6 Hong Kong.....	26
5.7 Africa/Afrique.....	27
6.0 Cumulative Environmental Effects/Effets environnementaux cumulatifs.....	27
7.0 Problems and Issues/Questions et problèmes.....	28
8.0 Public Participation/Participation du public.....	29

About This Bibliography

This bibliography attempts to provide users with an extensive, up-to-date listing of monitoring/follow-up literature. It helps to guide the user through using sub-headings in order to identify the literature most relevant to the user's needs. The sub-headings in order are as follows: Guide/Manual, Background Information, Types of Monitoring, Case Studies, Location, Cumulative Environmental Effects, Problems/Issues, and Public Participation. Additionally, there are more specific headings under each sub-heading to address specific aspects of monitoring/follow-up.

The annotation provides a description of the document, as well as some key words to give more information to the reader to determine it's relevance to the area of interest. The annotation does not evaluate the literature, but rather it is presented to the reader to make their own judgments.

Any comments or suggestions to this bibliography should be directed to the attention of:

John McEwen
Canadian Environmental Assessment Agency
14th Floor, 200 Sacré-Coeur Blvd.
Hull, Quebec
Canada, K1A 0H3

Telephone: (819) 953-8797
Fax: (819) 953-8592

1.0 Guide / Manual

Acres International Limited. 1992. *"Canadian Environmental Assessment Act: Standard Operating Procedures for Follow-Up Programs"* Draft prepared for the Federal Environmental Assessment Review Office: Hull, Quebec.

Keywords: Canada, responsibility, methodology. **Description:** The paper outlines the responsibilities of all of the key players in developing follow-up programs. It is intended to provide guidance for various actors (i.e. mediators, CEAA, review panels).

Brassat, S.H. 1995. *"A Framework for Follow-Up on Environmental Assessments for Natural Resources Canada"* Prepared for the Office of Environmental Affairs Natural Resources Canada.

Keywords: CEA Act, cost-savings, framework. **Description:** This guide outlines a process for follow-up on EAs for Natural resources Canada. It also summarizes the requirements for follow-up under the Canadian Environmental Assessment Act.

Davies, M and B. Sadler. 1990. *"Post-project Analysis and the Improvement of Guidelines for Environmental Monitoring and Audit"* Prepared for the Environmental Assessment Division Conservation and Protection Environment Canada.

Keywords: baseline monitoring, scope, methodology. **Description:** This document presents guidelines for monitoring and auditing environmental impacts for the purpose of improving the EA process as a whole. Specifically the paper focuses on baseline effects monitoring, formulating environmental impact predictions, classifying environmental impacts, reporting on results, and planning and conducting an audit properly.

Draggan, Sidney and J.J. Cohrssen and R.E. Morrison. 1985. *"Environmental Monitoring Assessment, and Management: The Agenda for Long-Term Research and Development"* Presented to the Council on Environmental Quality.

Keywords: modeling, forecasting, risk impact assessment, ecological models, indicators. **Description:** This document summarizes the findings and recommendations of the Expert Panel meeting to discern the current state of long-term environmental research and development activities.

Environmental Protection Department: Hong Kong Government. 1996. *"Generic Environmental Monitoring and Audit Manual"*

Keywords: Hong Kong, air quality, water quality, waste management. **Description:** This is a guide to be used by EIA consultants to ensure compliance with EIA study recommendations to assess the effectiveness of the recommended mitigation measures. It aims to provide systematic procedures for monitoring and auditing.

Everitt, Robert R. 1991. *"Environmental Effects Monitoring Manual"* Manuscript Report prepared for the Canadian Environmental Assessment Research Council.

Keywords: methodology, decision-making, case studies. **Description:** This document outlines general principles for environmental effects monitoring to guide practitioners. The manual focuses on improving the practice of EIAs through monitoring, as well as monitoring programs which assess the effectiveness of environmental protection measures in a regulatory setting.

Everitt, Robert R. 1992. *"Environmental Effects Monitoring Manual"* Prepared for the Federal Environmental Assessment Review Office.

Keywords: methodology, EEM, ecological approach, cumulative effects. **Description:** This manual provides guidance to the non-technically oriented manager responsible for the overall design and execution of EEM programs. It also describes a rationale for how to design effective EEM programs.

Graves-Marcus, Linda. 1979. *"A Methodology for Post-EIS Monitoring"* Geology Survey Circular 782.

Keywords: methodology, case study, Idaho, NEPA. **Description:** This document sets out a strategy for environmental professionals for monitoring impacts caused by federal actions as a means of improving the accuracy of EIS predictions. The methodology was produced using a case study on phosphate development in Southeastern Idaho.

International Organization for Standardization. 1996. *"Guidelines for Environmental Auditing-Audit Procedures-Auditing of Environmental Management Systems"* Draft International Standard.

Keywords: audit, responsibilities, scope. **Description:** This guide identifies the roles and responsibilities of various actors involved in the auditing process. Suggestions are also given on how to prepare the audit report and how to conduct an audit.

International Organization for Standardization. 1996. *"Guidelines for Environmental Auditing-Qualification Criteria for Environmental Auditors"* Draft International Standard.

Keywords: methodology, education, definitions, scope. **Description:** The aim of this paper is to provide guidance on qualification criteria for environmental auditors and lead auditors.

International Organization for Standardization. 1996. *"Environmental Management Systems-Specification with Guidance for Use"* Draft International Standard.

Keywords: audit, management system, definitions. **Description:** This guide stresses the importance of a management system with monitoring as a key asset for the purpose of enabling an organization to formulate a policy and objectives which take into account significant environmental impacts.

Kennicutt, Mahlon C. et al. 1996. *"Monitoring of Environmental Impacts from Science and Operations"* Prepared for The Scientific Committee on Antarctic Research and The Council of Managers of National Antarctic Programs.

Keywords: Antarctica, case study, methodology. **Description:** The paper identifies the importance of establishing an improved monitoring program in Antarctica. Some case studies are examined to illustrate the above point. As well, a framework or methodology is laid out to suggest how to properly carry out a monitoring process.

Silsbee, David and David Peterson. 1992. *"Planning for Implementation of Long-Term Resource Monitoring Programs"* Environmental Monitoring and Assessment, Vol. 26, No. 2-3, pp. 177-185.

Keywords: methodology, guidelines, National Park Service. **Description:** The article identifies a number of well defined planning steps to be followed before the monitoring process begins. It focuses on how to develop a monitoring program, rather than how to monitor a specific project.

2.0 Background Information

Allison, R.C. 1988. *"Some Perspectives on Environmental Auditing"* The Environmental Professional, Vol. 10, pp. 185-188.

Keywords: framework, audit, benefits. **Description:** This article presents some observations on the rationale for initiating environmental monitoring. It also describes the framework in which audits are conducted, and the benefits associated with it.

Assessment and Audit Group: Hong Kong Government. 1996. *"Environmental Monitoring and Audit of the Airport Core Programme Projects in Hong Kong"*

Keywords: methodology, Hong Kong, case study, terminology. **Description:** This report presents the environmental monitoring and audit system used in Hong Kong for the airport core program. Methodology, findings, and case illustrations are discussed.

Au, Elvis W.K. 1995. *"EIA Follow up Monitoring and Management"* International Study of the Effectiveness of Environmental Assessment. Environmental Protection Department: Hong Kong.

Keywords: cumulative effects, cost-effectiveness, SEA, Hong Kong. **Description:** This document outlines the various roles in the monitoring process, as well as what has been done in practice in different jurisdictions, and what should be done during this phase of environmental impact assessment. The paper also focuses on practical issues that may be encountered during the follow up process.

Bankes, N. and A.R. Thompson. 1980. *"Monitoring for Impact Assessment and Management: An Analysis of the Legal and Administrative Framework"* Prepared for the Economic Council of Canada.

Keywords: public participation, legal requirements, framework. **Description:** This study examines the nature of major development projects and the problems they present for impact assessment and decision-making. The function of monitoring is discussed as well as the legal and institutional requirements of an effective monitoring program.

Beanlands, R. and P.N. Duinker. 1984. "*An Ecological Framework for Environmental Impact Assessment*" *Journal of Environmental Management*, Vol. 18, pp. 267-277.

Keywords: ecological impact analysis, time boundaries, space boundaries. **Description:** This article examines methods of improving EIAs using an ecological perspective. It recommends institutional initiatives for improving the practice of ecological impact studies.

Bisset, R. and P. Tomlinson. "*Monitoring and Auditing of Impacts*" *Environmental Impact Assessment: Theory and Practice*, Ch. 7, pp. 117-128. Edited by Peter Wathern.

Keywords: audit, mitigation, UK. **Description:** This report identifies and discusses the various functions of monitoring within the EIA process. Audit studies are also examined to illustrate how they are an important tool for testing mitigation and monitoring schemes.

Blodgett, J. E. 1979. "*Environmental Monitoring*" The Library of Congress Congressional Research Service Major Issue System: Issue Brief No. IB78021.

Keywords: US, policy, baseline data, ambient monitoring. **Description:** The brief explores the problem of the absence of a monitoring program in the US. It examines some background information, problems / issues, and two basic schemes for creating an adequate national monitoring system.

Canter, Larry W. 1993. "*The Role of Environmental Monitoring in Responsible Project Management*" *The Environmental Professional*, Vol. 15, pp. 76-87.

Keywords: US, NEPA, case study. **Description:** This document provides background information about monitoring and stresses the need to incorporate it into the EIA process, possibly amending NEPA.

Canter, L.W. and D.M. Fairchild. 1986. "*Post-EIS Environmental Monitoring*" *Impact Assessment Bulletin*, Vol. 4, No. 3/4, pp. 265-285.

Keywords: EIS, mitigation. **Description:** This paper focuses on the purpose, premise, planning considerations, and potential problems of environmental monitoring.

Davies, M and B. Sadler. 1990. "*Post-project Analysis and the Improvement of Guidelines for Environmental Monitoring and Audit*" Prepared for the Environmental Assessment Division Conservation and Protection Environment Canada.

Keywords: baseline monitoring, scope, methodology. **Description:** This document presents guidelines for monitoring and auditing environmental impacts for the purpose of improving the EA process as a whole. Specifically the paper focuses on baseline effects monitoring, formulating environmental impact predictions, classifying environmental impacts, reporting on results, and planning and conducting an audit properly.

Duinker, Peter. 1983. "*Effects Monitoring in Environmental Impact Assessment*" *Environmental Impact Assessment Review*, pp. 117-143.

Keywords: objectives, case studies, terminology. **Description:** This document reveals the importance of effects monitoring as a critical element of the EIA process. It identifies that EIAs to date have not been characterized by well designed monitoring studies. The author

stresses the fact that the EIA process would greatly benefit and contribute more effectively to development decision-making.

Fookes, T.W. 1987. *"Social Impact Assessment: Feedback from the Huntly Monitoring Project"* Planning Quarterly, pp. 18-20.

Keywords: social impact assessment, framework, objectives. **Description:** This paper provides some new perspectives on monitoring within SIA by examining the environmental monitoring aspect, and the Huntly Power Station research project.

Greene, George and Douglas S. Wright. 1990. *"Environmental Follow-Up in the Federal Environmental Assessment Review Process"* Prepared for Federal Environmental Assessment Review Office.

Keywords: methodology, definitions, objectives, EARP. **Description:** This report outlines the objectives of environmental follow-up and also suggests a framework to carry it out. The rationale and need for a follow-up program are also discussed.

Hardy Associates Ltd. May 1985. *"Environmental Effects Monitoring Workshop: Expanded Working Notes in Support of the Agenda"* Prepared for Environmental Impact Systems Division, Environmental Protection Service, Environment Canada. Ottawa, Ontario. May 28-29, 85.

Keywords: policy, auditing, federal / provincial jurisdiction, auditing. **Description:** This working document gives a thorough description of the Environmental Effects Monitoring (EEM) program and provides background information on monitoring as well as definitions, benefits, attributes, functions, and issues.

Munro, David A. 1985. *"Learning From Experience: Auditing Environmental Impact Assessments"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Commissioned Research, Vol. 1.

Keywords: terminology, mitigation, framework. **Description:** This paper focuses on the follow-up studies and summarizes the state-of-the-art review. Its purpose is to contribute to environmental management by examining and evaluating some aspects of impact assessment.

Munro, D. and Bryant, T. J. and Matte-Baker, A. 1986. *"Learning From Experience: A state-of-the-art Review and Evaluation of Environmental Impact Assessment Audits"* Prepared for the Canadian Environmental Assessment Research Council.

Keywords: audits, policies, terminology, cost-effectiveness. **Description:** This document presents some background information and is based upon 10 follow-ups of EAs.

National Research Council. 1990. *"The Role of Monitoring in Environmental Management"* Managing Troubled Waters: The Role of Marine Environmental Monitoring, National Academy Press, Chap. 2.

Keywords: decision-making, objectives, framework, marine environment. **Description:** This chapter examines the role and importance of monitoring in environmental

management. It discusses the evolution of the process as well as success stories and methods to strengthen the procedure.

Ortolano, Leonard and A. Shepherd. 1995. *"Environmental Impact Assessment: Challenges and Opportunities"* Impact Assessment, Vol. 13, pp. 3-30.

Keywords: methodology, NEPA, audits, mitigation. **Description:** The article begins with an overview on conceptions of EAs in general and what they are set out to achieve. The article then questions the positive and negative effects of the EIA process on projects. Of the shortcomings listed, lack of monitoring in the EA process is identified.

Rigby, Bruce G. 1982. *"Environmental Impact Assessment and the Need for Environmental Monitoring"* A Thesis Submitted to the Faculty of Graduate Studies: Carleton University, Ottawa.

Keywords: case study, evaluation, audit, framework. **Description:** The thesis establishes the need for a project environmental monitoring program, and also develops a framework to carry out monitoring. Through the evaluation of an EIA of a case study, it could be seen whether the panel recommendations were acted upon, how they have affected the process, and if they decreased negative environmental effects.

White, Gilbert. 1995. *"Emerging Issues in Global Environmental Policy"* Ambio, Vol. 25, pp. 58-60.

Keywords: post-audit, public involvement, case examples. **Description:** The article identifies three particular issues regarding global environmental policy which require examination. One of the issues mentioned is the lack of monitoring; some case examples are identified to illustrate the point further.

3.0 Monitoring

3.1 Environmental Effects

Conover, Shirley A.M. 1985. *"Environmental Effects Monitoring and Environment Canada: A Synthesis of the Findings of Four Workshops"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 408-434.

Keywords: terminology, methodology, Environment Canada. **Description:** This report represents a synthesis of the findings of four workshops which worked toward developing a draft of environmental effects monitoring guidelines and policies for Environment Canada.

Duinker, Peter. 1983. *"Effects Monitoring in Environmental Impact Assessment"* Environmental Impact Assessment Review, pp. 117-143.

Keywords: objectives, case studies, terminology. **Description:** This document reveals the importance of effects monitoring as a critical element of the EIA process. It identifies that EIAs to date have not been characterized by well designed monitoring studies. The author

stresses the fact that the EIA process would greatly benefit and contribute more effectively to development decision-making.

Duinker, Peter. 1989. *"Ecological Effects Monitoring in Environmental Impact Assessment: What Can it Accomplish?"*

Environmental Management, Vol. 13, No. 6, pp. 797-805.

Keywords: forecasting, simulation models, baseline measurements. **Description:** The article defends the premise that impact monitoring is impossible. Monitoring is undertaken to meet the basic goal of reducing uncertainty in predictions.

Environment Canada: Department of Fisheries and Oceans. 1992. *"Aquatic Environmental Effects Monitoring Requirements"*

Keywords: aquatic monitoring, terminology, methodology, sampling design.

Description: This paper addresses an environmental effects monitoring program for regulations dealing with effluent discharges to fish habitat. Objectives and program requirements are discussed.

Everitt, Robert R. 1991. *"Environmental Effects Monitoring Manual"* Manuscript Report prepared for the Canadian Environmental Assessment Research Council.

Keywords: methodology, decision-making, case studies. **Description:** This document outlines general principles for environmental effects monitoring to guide practitioners. The manual focuses on improving the practice of EIAs through monitoring, as well as monitoring programs which assess the effectiveness of environmental protection measures in a regulatory setting. Case studies are appended.

Everitt, Robert R. 1992. *"Environmental Effects Monitoring Manual"* Prepared for the Federal Environmental Assessment Review Office.

Keywords: methodology, EEM, ecological approach, cumulative effects. **Description:** This manual provides guidance to the non-technically oriented manager responsible for the overall design and execution of EEM programs. It also describes a rationale for how to design effective EEM programs.

Hardy Associates Ltd. 1985. *"Environmental Effects Monitoring Workshop: Expanded Working Notes in Support of the Agenda"* Prepared for Environmental Impact Systems Division, Environmental Protection Service, Environment Canada. Ottawa, Ontario. May 28-29, 85.

Keywords: policy, auditing, federal / provincial jurisdiction, auditing. **Description:** This working document gives a thorough description of the Environmental Effects Monitoring (EEM) program and provides background information on monitoring as well as definitions, benefits, attributes, functions, and issues.

Maritime Testing Limited. 1987. *"Use of Effects Monitoring in Environmental Impact Assessment and Environmental Management"* Prepared for Environment Canada: Federal Environmental Assessment Review Office.

Keywords: pollutants, bioeffects, ecotoxicology. **Description:** This report attempts to determine whether results of chemical pollution bioeffects monitoring tests would provide at the same time effective environmental early warning systems.

3.2 Compliance

Baily, John and V. Hobbs and A. Saunders. 1990. *"Environmental Auditing: Artificial Waterway Developments in Western Australia"* Journal of Environmental Management, Vol. 34, pp 1-13.

Keywords: Australia, compliance audit, methodology, artificial waterways, prediction audit. **Description:** An environmental audit of a range of artificial waterway developments in Western Australia is discussed. Three types of audits are reported: compliance, prediction, and EIA procedures.

Wen-Shyan, L. and W.P. Williams and A.W. Bark. 1996. *"Development of an Environmental Impact Assessment Evaluation Model and its Application: Taiwan Case Study"* Environmental Impact Assessment Review, Vol. 16, No. 2, pp. 115-133.

Keywords: model, Taiwan, compliance. **Description:** This article describes an EIA evaluation model that can be used to assess the effectiveness of EIA systems. A case example in Taiwan is used to demonstrate the model. One of the evaluation criteria is compliance monitoring and enforcement.

3.3 Baseline

Davies, M and B. Sadler. 1990. *"Post-project Analysis and the Improvement of Guidelines for Environmental Monitoring and Audit"* Prepared for the Environmental Assessment Division Conservation and Protection Environment Canada.

Keywords: baseline monitoring, scope, methodology. **Description:** This document presents guidelines for monitoring and auditing environmental impacts for the purpose of improving the EA process as a whole. Specifically the paper focuses on baseline effects monitoring, formulating environmental impact predictions, classifying environmental impacts, reporting on results, and planning and conducting an audit properly.

Duinker, Peter. 1989. *"Ecological Effects Monitoring in Environmental Impact Assessment: What Can it Accomplish?"*

Environmental Management, Vol. 13, No. 6, pp. 797-805.

Keywords: forecasting, simulation models, baseline measurements. **Description:** The article defends the premise that impact monitoring is impossible. Monitoring is undertaken to meet the basic goal of reducing uncertainty in predictions.

Grady, S. and R. Braid and J. Bradbury and C. Kerley. 1987. *"Socioeconomic Assessment of Plant Closure: Three Case Studies of Large Manufacturing Facilities"* Environmental Impact Assessment Review, Vol. 7, pp. 151-165.

Keywords: SEIA, case studies, baseline data, public involvement. **Description:** This article compares the forecasted and actual impacts that would follow an eventual plant closing to contribute to baseline knowledge in plant closure evaluations and socioeconomic impacts assessments.

Shackell, N.L. and B. Freedman and C. Staicer. 1993. *"National Environmental Monitoring: A Case Study of the Atlantic Maritime Region"* Ecological Integrity and the Management of Ecosystems, St. Lucie Press, pp. 131-154.

Keywords: ecological integrity, framework, baseline data, indicators. **Description:** This document presents a suggested framework for a national environmental monitoring program. A case study is used to illustrate the use of the framework.

3.4 Audits

Baily, John and V. Hobbs and A. Saunders. 1990. *"Environmental Auditing: Artificial Waterway Developments in Western Australia"* Journal of Environmental Management, Vol. 34, pp. 1-13.

Keywords: Australia, compliance audit, methodology, artificial waterways, prediction audit. **Description:** An environmental audit of a range of artificial waterway developments in Western Australia is discussed. Three types of audits are reported: compliance, prediction, and EIA procedures.

Bisset, Ronald. 1980. *"Problems and Issues in the Implementation of EIA Audits"* Environmental Assessment Review, Vol. 1, No. 4, pp. 379-398.

Keywords: compliance, baseline, case examples, US, NEPA. **Description:** The article briefly identifies the main objectives of monitoring. A case example is used to illustrate the many problems faced when a monitoring program is administered.

Bisset, Ronald. 1984. *"Post-Development Audits to Investigate the Accuracy of Environmental Impact Predictions"* Zeitschrift für Umweltpolitik, Vol. 4, No. 84, pp. 463-484.

Keywords: UK, case studies, predictions, US experience. **Description:** Research results of four case studies in the UK are analyzed, as well as the problems which may arise when carrying out an audit. The implications of audits on future EAs is examined.

Bisset, R. and P. Tomlinson. *"Monitoring and Auditing of Impacts"* Environmental Impact Assessment: Theory and Practice, Chapter 7, pp. 117-128. Edited by Peter Wathern.

Keywords: audit, mitigation, UK. **Description:** This report identifies and discusses the various functions of monitoring within the EIA process. Audit studies are also examined to illustrate how they are an important tool for testing mitigation and monitoring schemes.

Buckley, Ralph. 1989. *"Auditing the Precision and Accuracy of Environmental Impact Predictions in Australia"* Environmental Monitoring and Assessment, Vol. 18, No. 1, pp. 1-23.

Keywords: audit, Australia, predictions. **Description:** This paper studied auditing in Australia by choosing projects with the best available data and the most intensive monitoring data to provide a critical test of the accuracy of impact predictions. Overall patterns, trends and results are discussed.

Canadian Environmental Assessment Research Council (CEARC). 1988. *"Evaluating Environmental Impact Assessment: An Action Prospectus"*

Keywords: cause and effect relationship, pre / post monitoring, framework. **Description:** This document evaluates the effectiveness of the impact assessment process according to three central themes; one of them being the accuracy of predicting the magnitude of impacts, (auditing). Pre- and post- monitoring procedures are analyzed as well as the issues which need to be dealt with.

Clark, B.D. and R. Bisset and P. Tomlinson. 1985. *"Environmental Assessment Audits in the UK: Scope, Results and Lessons for Future Practice"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 519-540.

Keywords: UK, case study, baseline data. **Description:** This paper discusses the potentially important role monitoring could play in improving EA systems generally. The different types of audits are identified and explained.

Davies, M and B. Sadler. 1990. *"Post-project Analysis and the Improvement of Guidelines for Environmental Monitoring and Audit"* Prepared for the Environmental Assessment Division Conservation and Protection Environment Canada.

Keywords: baseline monitoring, scope, methodology. **Description:** This document presents guidelines for monitoring and auditing environmental impacts for the purpose of improving the EA process as a whole. Specifically the paper focuses on baseline effects monitoring, formulating environmental impact predictions, classifying environmental impacts, reporting on results, and planning and conducting an audit properly.

Duinker, Peter. 1987. *"Forecasting Environmental Impacts: Better Quantitative and Wrong than Qualitative and Untestable"* Audit and Evaluation in Environmental Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 399-407.

Keywords: prediction, forecast, quantitative, qualitative. **Description:** This paper asserts that it is better to forecast environmental impacts quantitatively than qualitatively (which renders them untestable). Some examples are used to illustrate the above argument.

Hooson, J.O. and R.C. Embree and M.L. Jeffers. 1985. *"Environmental Appraisal and Audits: A Case Study of their Application by the Bonneville Power Administration"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 796-815.

Keywords: case study, appraisal, methodology, scope. **Description:** This paper presents the goals and objectives of the Environmental Appraisal Program of the Bonneville Power Administration. The scope and components of the program are analyzed as well.

International Organization for Standardization. 1996. *"Guidelines for Environmental Auditing-General Principles"* Draft International Standard.

Keywords: general principles, audit, definitions. **Description:** This guide focuses on the general principles of environmental auditing and includes definitions and basic background information on the methodology of auditing.

Locke, James C. 1995. *"Socio-Economic Impact Assessment Auditing: A Critique Using the Case Study of the Hibernia Offshore Oil Development Project"* Thesis Submitted to the School of Graduate Studies: Memorial University of Newfoundland.

Keywords: audit, case study, socio-economic effects, Hibernia. **Description:** This thesis investigates socio-economic impact assessment auditing using a case study. An auditing method is established based on the flaws and experiences of prior audits to date, and is then employed in the case study.

Tomlinson, Paul and S.F. Atkinson. 1986. *"Environmental Audits: Proposed Terminology"* Environmental Monitoring and Assessment Special Issue, Vol. 8, No. 3, pp. 187-197.

Keywords: audit, definitions, draft EIS. **Description:** This paper presents a review of environmental auditing and includes a series of definitions which attempt to address the uncertainty of an accepted vocabulary for environmental impact assessment.

Tomlinson, Paul and S.F. Atkinson. 1986. *"Environmental Audits: A Literature Review"* Environmental Monitoring and Assessment Special Issue, Vol. 8, No. 3, pp. 187-197.

Keywords: US, UK, case studies, predictive technique **Description:** This paper presents a literature review focused on predictive technique audits. The literature is limited to US and UK case examples. The document also discusses the current status of the EIA process.

3.5 Integrated Monitoring

Brydges, T.G. et al. 1992. *"Monitoring for Integrated Analysis"* Integrated Monitoring in the US-Canada Transboundary Region- Final Report to The International Air Quality Advisory Board.

Keywords: ecosystem approach, Canada, US, transboundary, case examples.

Description: This report summarizes the activities of an Expert Group on Monitoring to examine environmental monitoring programs across the entire Canada-US transboundary region. The integrated approach to monitoring is examined by the Group.

Hicks, Bruce B. and T.G. Brydges. 1994. *"A Strategy for Integrated Monitoring"* Environmental Management, Vol. 18, No. 1, pp. 1-12.

Keywords: model, baseline data, feedback, integrated monitoring, nested networks.

Description: This article presents the concept of integrated monitoring as a more advanced type of monitoring process which attempts to unify different measurement methodologies in various disciplines.

Marine Environmental Quality Advisory Group: Monitoring Task Force. 1991. *"Partnerships for Integrated Monitoring of Marine Environmental Quality: A Discussion Paper"* Prepared for Environment Canada Conservation and Protection Service. **Keywords:** MEQ, integrated monitoring, ecosystem approach. **Description:** This report discusses integrated monitoring for marine environmental quality to improve the interpretation of biological effects measures.

4.0 Case Studies

Assessment and Audit Group: Hong Kong Government. May 1996. *"Environmental Monitoring and Audit of the Airport Core Programme Projects in Hong Kong"* **Keywords:** methodology, Hong Kong, case study, terminology. **Description:** This report presents the environmental monitoring and audit system used in Hong Kong for the airport core program. Methodology, findings, and case illustrations are discussed.

Baily, John and V. Hobbs and A. Saunders. 1990. *"Environmental Auditing: Artificial Waterway Developments in Western Australia"* Journal of Environmental Management, Vol. 34, pp 1-13.

Keywords: Australia, compliance audit, methodology, artificial waterways, prediction audit. **Description:** An environmental audit of a range of artificial waterway developments in Western Australia is discussed. Three types of audits are reported: compliance, prediction, and EIA procedures.

Beanlands, G.E. and P.N. Duinker. 1984. *"Lessons From a Decade of Offshore Environmental Impact Assessment"* Ocean Management, Vol. 9, No. 3-4, pp. 157-175.

Keywords: offshore development, prediction, US, UK, Canada. **Description:** The approaches of three nations to EIA for offshore development are compared. Topics of discussion include the difficulties of impact prediction and monitoring, and the lessons learned after more than ten years of experience.

Bisset, Ronald. 1984. *"Post-Development Audits to Investigate the Accuracy of Environmental Impact Predictions"* Zeitschrift fur Umweltpolitik, Vol. 4, No. 84, pp. 463-484.

Keywords: UK, case studies, predictions, US experience. **Description:** Research results of four case studies in the UK are analyzed, as well as the problems which may arise when carrying out an audit. The implications of audits on future EAs are examined.

Bres, Faye A. 1992. *"Post-Project Analysis: A Case Study of the Jolu Gold Mine, Northern Saskatchewan"* A Manuscript Report Prepared for the Canadian Environmental Assessment Research Council.

Keywords: Saskatchewan, mitigation, case study. **Description:** The document examines the results of a post-project analysis of the Jolu Gold Mine. An evaluation is conducted on the accuracy of the predictions of environmental impacts made during the assessment.

Davies, Katherine. 1991. *"Monitoring for Cumulative Environmental Effects: A Review of Seven Environmental Monitoring Programs"* Second Draft prepared for The Federal Environmental Assessment Review Office and Environment Canada.

Keywords: cumulative effects, CEAA, case studies, methodology. **Description:** This paper discusses suggestions of how environmental monitoring programs can address cumulative environmental effects as well as to provide advice to program managers on how environmental monitoring programs can take into account cumulative environmental effects. Some examples are examined to further illustrate the point.

Dirschl, H.J. and N.S. Novakowski and S.M. Husain. 1993. *"Environmental Auditing: Evolution of Environmental Impact Assessment as Applied to Watershed Modification Projects in Canada"* Environmental Management, Vol. 17, No. 4, pp. 545-555.

Keywords: watershed modification, case study, river diversion. **Description:** This article reviews the application of EIA procedures and practices to three watershed projects in W. Canada.

Economic Commission for Europe. 1990. *"Post-Project Analysis in Environmental Impact Assessment"* Environmental Series 3.

Keywords: case study, post-project analysis, legal policies. **Description:** This report provides a summary description of the case studies as well as the results of the analysis. Some background information is provided at the beginning of the document. The legal policies of PPA are discussed for various countries arraign the world.

Everitt, Robert R. 1991. *"Environmental Effects Monitoring Manual"* Manuscript Report prepared for the Canadian Environmental Assessment Research Council.

Keywords: methodology, decision-making, case studies. **Description:** This document outlines general principles for environmental effects monitoring to guide practitioners. The manual focuses on improving the practice of EIAs through monitoring, as well as monitoring programs which assess the effectiveness of environmental protection measures in a regulatory setting. Case studies are appended.

Exner, K.K. and N.K. Nelson. 1985. *"Environmental Follow-Up to Assessment and Mitigation for Construction in Alberta"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 470-482.

Keywords: Alberta, pipeline project, case study, mitigation. **Description:** This report presents a case study on a pipeline project in Alberta to evaluate the assessment and mitigation design.

Fee-Yee Consulting Ltd. 1985. *"Environmental Assessment, Monitoring and Surveillance of the Norman Wells Project with Particular Reference to Fish and Water"*

Quality: Downstream Perspectives and Concerns of the Dene Nation" Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 484-501.

Keywords: Mackenzie Valley, surveillance, case study, water quality. **Description:** This report evaluates an EA of a case study in terms of monitoring and surveillance. It specifically addresses questions of the predictive capability of project EAs.

Fookes, T.W. 1987. *"Social Impact Assessment: Feedback from the Huntly Monitoring Project"* Planning Quarterly, pp. 18-20.

Keywords: social impact assessment, framework, objectives. **Description:** This paper provides some new perspectives on monitoring within SIA by examining the environmental monitoring aspect, and the Huntly Power Station research project.

Grady, S. and R. Braid and J. Bradbury and C. Kerley. 1987. *Socioeconomic Assessment of Plant Closure: Three Case Studies of Large Manufacturing Facilities*" Environmental Impact Assessment Review, Vol. 7, pp. 151-165.

Keywords: SEIA, case studies, baseline data, public involvement. **Description:** This article compares the forecasted and actual impacts that would follow the eventual plant closing to contribute to baseline knowledge in plant closure evaluations and socioeconomic impacts assessments.

Graves-Marcus, Linda. 1979. *"A Methodology for Post-EIS Monitoring"* Geology Survey Circular 782.

Keywords: methodology, case study, Idaho, NEPA. **Description:** This document sets out a strategy for environmental professionals for monitoring impacts caused by federal actions as a means of improving the accuracy of EIS predictions. The methodology was produced using a case study on phosphate development in Southeastern Idaho.

Hooson, J.O. and R.C. Embree and M.L. Jeffers. 1985. *"Environmental Appraisal and Audits: A Case Study of their Application by the Bonneville Power Administration"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 796-815.

Keywords: case study, appraisal, methodology, scope. **Description:** This paper presents the goals and objectives of the Environmental Appraisal Program of the Bonneville Power Administration. The scope and components of the program are analyzed as well.

Jakimchuk, R.D. 1995. *"Follow-Up to Environmental Assessment for Pipeline Projects in Canada: The Missing Link"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience" Commissioned Research, Vol. 1.

Keywords: case study, pipeline project, mitigation, accountability. **Description:** The paper addresses the evolution of environmental issues raised before environmental assessment. It also reviews three northern pipeline projects and analyses the changes in mitigative measures over time.

Locke, James C. 1995. *"Socio-Economic Impact Assessment Auditing: A Critique Using the Case Study of the Hibernia Offshore Oil Development Project"* Thesis Submitted to the School of Graduate Studies: Memorial University of Newfoundland.

Keywords: audit, case study, socio-economic effects, Hibernia. **Description:** This thesis investigates socio-economic impact assessment auditing using a case study. An auditing method is established based on the flaws and experiences of prior audits to date, and is then employed in the case study.

MacViro Consultants Inc. 1995. *"Cumulative Effects Monitoring Program for the Niagara Escarpment Plan Area"*

Phase 2: Final Report.

Keywords: framework, Niagara Escarpment, cumulative effects. **Description:** This report presents the cumulative effects monitoring program for the Niagara Escarpment.

Mulvihill, Peter and R.F. Keith. 1989. *"Institutional Requirements for Adaptive EIA: The Kativik Environmental Quality Commission"* Environmental Impact Assessment Review, Vol. 9, pp. 399-412.

Keywords: case studies, Quebec, organization. **Description:** This paper uses a case study to describe some of the critical design features which may pre-dispose EIA organizations to be adaptive. The study also seeks to identify relationships between adaptiveness and the quality of environmental assessment in terms of effectiveness, efficiency, and fairness.

Munn, R.E. 1994. *"The Design of Long-Term Environmental Monitoring Programs for CEAs"* The Inclusion of Long Term Global Futures in Cumulative Environmental Assessments: Environmental Monograph No. 11, Ch. 6, pp. 53-61.

Keywords: model, cumulative effects, ecosystem approach, VECs, case examples.

Description: This chapter discusses two important goals of an EIA or CEA monitoring program. It examines the accuracy of predictions and the goal of an early warning that remedial action may be necessary.

Rigby, Bruce. 1982. *"Environmental Impact Assessment and the Need for Environmental Monitoring"* A Thesis Submitted to the Faculty of Graduate Studies: Carleton University, Ottawa.

Keywords: case study, evaluation, audit, framework. **Description:** The thesis establishes the need for a project environmental monitoring program, and also develops a framework to carry out monitoring. Through the evaluation of an EIA of a case study, it could be seen whether the panel recommendations were acted upon, how they have affected the process, and if they decreased negative environmental effects.

Rigby, Bruce. *"Post-Development Audits in Environmental Impact Assessment"* New Directions in Environmental Impact Assessment in Canada, Methuen. Edited by V. Maclaren and J. Whitney.

Keywords: case study, public involvement, recommendations. **Description:** This paper examines reasons why monitoring has not become common at the federal level in Canada.

It also discusses the current state of post-development audits in Canada by analyzing case studies.

Ross, W.A. and G.D. Tench. 1987. *"CP Rail Rogers Pass Development: A Post-Project Analysis"* Prepared for Environment Canada.

Keywords: CP Rail, environmental management, mitigation measures. **Description:** The purpose of this report is to produce a critical evaluation of the environmental aspects of the case study. Two specific areas were studied: impact identification and effectiveness of the environmental management structure.

Ruggles, C.P. 1985. *"Follow-Up Ecological Studies at the Wreck Cove Hydroelectric Development, Nova Scotia"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience" Commissioned Research, Vol. 1.

Keywords: hydroelectric development, Nova Scotia, mitigation. **Description:** This paper examines selected environmental predictions and mitigative measures identified for a specific case study.

Serafin, R. and G. Nelson. and R. Butler. 1992. *"Post Hoc Assessment in Resource Management and Environmental Planning: A Typology and Three Case Studies"* Environmental Impact Assessment Review, Vol. 12, pp. 271-294.

Keywords: case studies, descriptive-analytic, interactive-interpretive, adaptive-evolving. **Description:** The article examines the methodological and theoretical limitations in the mode of inquiry adopted in three types of post hoc assessment.

Shackell, N.L. and B. Freedman and C. Staicer. 1993. *"National Environmental Monitoring: A Case Study of the Atlantic Maritime Region"* Ecological Integrity and the Management of Ecosystems, St. Lucie Press, pp. 131-154.

Keywords: ecological integrity, framework, baseline data, indicators. **Description:** This document presents a suggested framework for a national environmental monitoring program. A case study is used to illustrate the use of the framework.

Sparkes, Ron. 1995. *"Institute for Environmental Monitoring and Research"* Final Report.

Keywords: Canada, case study, framework, decision-making. **Description:** This report overviews the framework of the Institute for Environmental Monitoring and Research related to low-level military flying activities in Labrador and Quebec.

Spencer, Richard B. 1985. *"An Evaluation of the Procedural Aspects of the Shikwak Project Environmental Program"* Audit and Evaluation in Environmental Assessment and Management: Canadian International Experience, Commissioned Research, Vol. 1.

Keywords: Public Works, US, case study, methodology. **Description:** This paper is a synopsis of the procedural aspects of an environmental follow-up study of the Shikwak Highway Project. The objective is to examine the administrative methods employed by Public Works.

Unknown Author. 1988. *"Polar Bear Management in the Beaufort Sea" An Agreement Between Inuvialuit Game Council and North Slope Borough Fish and Game Management Committee.*

Keywords: case example, Alaska, Canada, Marine Mammal Protection Act. **Description:** This report provides a brief overview of the current status and knowledge regarding polar bears in the Beaufort Sea along with a description of identified management needs.

Wen-Shyan, L., W.P. Williams and A.W. Bark. 1996. *"Development of an Environmental Impact Assessment Evaluation Model and its Application: Taiwan Case Study"* Environmental Impact Assessment Review, Vol. 16, No. 2, pp. 115-133.

Keywords: model, Taiwan, compliance. **Description:** This article describes an EIA evaluation model that can be used to assess the effectiveness of EIA systems. A case example in Taiwan is used to demonstrate the model. One of the evaluation criteria is compliance monitoring and enforcement.

White, Gilbert. 1995. *"Emerging Issues in Global Environmental Policy"* Ambio, Vol. 25, pp. 58-60.

Keywords: post-audit, public involvement, case examples. **Description:** The article identifies three particular issues regarding global environmental policy which require examination. One of the issues mentioned is the lack of monitoring; some case examples are identified to illustrate the point further.

Woodly, S. 1993. *"Monitoring and Measuring Ecosystem Integrity in Canadian National Parks"* Ecosystem Integrity and the Management of Ecosystems, St. Lucie Press, pp. 155-176.

Keywords: ecosystem integrity, Canadian national parks, criteria, framework.

Description: This article reports on the general framework for ecosystem integrity monitoring in Canadian national parks by applying a definition of integrity to the objectives.

5.0 Location

5.1 Canada

Acres International Limited. 1992. *"Canadian Environmental Assessment Act: Standard Operating Procedures for Follow-Up Programs"*- Draft prepared for the Federal Environmental Assessment Review Office.

Keywords: Canada, responsibility, methodology. **Description:** The paper outlines the responsibilities of all of the key players in developing follow-up programs. It is intended to provide guidance for various actors (i.e. mediators, CEAA, review panels).

Beanlands, G.E. and P.N. Duinker. 1984. *"Lessons From a Decade of Offshore Environmental Impact Assessment"* Ocean Management, Vol. 9, No. 3-4, pp. 157-175.

Keywords: offshore development, prediction, US, UK, Canada. **Description:** The approaches of three nations to EIA for offshore development are compared. Topics of discussion include the difficulties of impact prediction and monitoring, and the lessons learned after more than ten years of experience.

Conover, Shirley A.M. 1985. *"Environmental Effects Monitoring and Environment Canada: A Synthesis of the Findings of Four Workshops"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 408-434.

Keywords: terminology, methodology, Environment Canada. **Description:** This report represents a synthesis of the findings of four workshops which worked toward developing a draft of environmental effects monitoring guidelines and policies for Environment Canada.

Davies, Katherine. 1991. *"Monitoring for Cumulative Environmental Effects: A Review of Seven Environmental Monitoring Programs"* Second Draft prepared for The Federal Environmental Assessment Review Office and Environment Canada.

Keywords: cumulative effects, CEAA, case studies, methodology. **Description:** This paper discusses suggestions of how environmental monitoring programs can address cumulative environmental effects as well as to provide advice to program managers on how environmental monitoring programs can take into account cumulative environmental effects. Some examples are examined to further illustrate the point.

Jakimchuk, R.D. 1995. *"Follow-Up to Environmental Assessment for Pipeline Projects in Canada: The Missing Link"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience, Commissioned Research, Vol. 1.

Keywords: case study, pipeline project, mitigation, accountability. **Description:** The paper addresses the evolution of environmental issues raised before environmental assessment. It also reviews three northern pipeline projects and analyses the changes in mitigative measures over time.

McCallum, David R. 1986. *"Follow-Up to Environmental Impact Assessment: Learning From the Canadian Government Experience"* Environmental Monitoring and Assessment Special Issue, Vol. 8, No. 3, pp. 187-197.

Keywords: Canada, federal process, terms of reference. **Description:** The EIA procedure for the Canadian federal government is briefly described as well as the status of follow-up to date. Areas for improving management and follow-up are identified, and a method for planning follow-up activities for specific projects is presented.

McCallum, David R. 1985. *"Environmental Follow-Up to Federal Projects: A National Review"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 731-749.

Keywords: federal projects, methodology, Canada. **Description:** This paper draws on interviews with EIA practitioners to examine overall perspectives on the status of follow-up and to identify factors which encourage or impede different types of follow-up. Some

suggestions are discussed as to what should be taken into account when planning follow-up activities.

Munro, David A. 1985. *"Learning From Experience: Auditing Environmental Impact Assessments"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience, Commissioned Research, Vol. 1.

Keywords: terminology, mitigation, framework. **Description:** This paper focuses on the follow-up studies and summarizes the state-of-the-art review. Its purpose is to contribute to environmental management by examining and evaluating some aspects of impact assessment.

5.2 United States

Beanlands, G.E. and P.N. Duinker. 1984. *"Lessons From a Decade of Offshore Environmental Impact Assessment"* Ocean Management, Vol. 9, No. 3-4, pp. 157-175.

Keywords: offshore development, prediction, US, UK, Canada. **Description:** The approaches of three nations to EIA for offshore development are compared. Topics of discussion include the difficulties of impact prediction and monitoring, and the lessons learned after more than ten years of experience.

Bisset, Ronald. 1980. *"Problems and Issues in the Implementation of EIA Audits"* Environmental Assessment Review, Vol. 1, No. 4, pp. 379-398.

Keywords: compliance, baseline, case examples, US, NEPA. **Description:** The article briefly identifies the main objectives of monitoring. A case example is used to illustrate the many problems faced when a monitoring program is administered.

Blodgett, J. E. 1979. *"Environmental Monitoring"* The Library of Congress Congressional Research Service Major Issue System: Issue Brief No. IB78021.

Keywords: US, policy, baseline data, ambient monitoring. **Description:** The brief explores the problem of the absence of a monitoring program in the US. It examines some background information, problems / issues, and two basic schemes for creating an adequate national monitoring system.

Bromberg, S.M. 1990. *"Identifying Ecological Indicators: An Environmental Monitoring and Assessment Program"* Journal of the Air Waste Management Association, Vol. 4, No. 7, pp. 976-978.

Keywords: indicators, Environmental Protection Agency, US. **Description:** This paper describes an environmental monitoring program produced by the US EPA to monitor the status and trends of the nations near-coastal waters, forests, freshwater wetlands, surface waters, and agroecosystems.

Canter, Larry W. 1993. *"The Role of Environmental Monitoring in Responsible Project Management"* The Environmental Professional, Vol. 15, pp. 76-87.

Keywords: US, NEPA, case study. **Description:** This document provides background information about monitoring and stresses the need to incorporate the it into the EIA process, possibly amending NEPA.

Culhane, Paul J. 1986. "*The Precision and Accuracy of US Environmental Impact Statements*" Environmental Monitoring and Assessment Special Issue, Vol. 8, No. 3, pp. 187-197.

Keywords: audit, US, case studies, forecasting. **Description:** This article attempts to evaluate the quality and effectiveness of Environmental Impact Statements. The paper also focuses on the technical precision of science to bear on resources decision-making which was introduced by NEPA.

5.3 Australia

Baily, John and V. Hobbs and A. Saunders. 1990. "*Environmental Auditing: Artificial Waterway Developments in Western Australia*" Journal of Environmental Management, Vol. 34, pp 1-13.

Keywords: Australia, compliance audit, methodology, artificial waterways, prediction audit. **Description:** An environmental audit of a range of artificial waterway developments in Western Australia is discussed. Three types of audits are reported: compliance, prediction, and EIA procedures.

Buckley, Ralph. 1989. "*Auditing the Precision and Accuracy of Environmental Impact Predictions in Australia*" Environmental Monitoring and Assessment, Vol. 18, No. 1, pp. 1-23.

Keywords: audit, Australia, predictions. **Description:** This paper studied auditing in Australia by choosing projects with the best available data and the most intensive monitoring data to provide a critical test of the accuracy of impact predictions. Overall patterns, trends and results are discussed.

Morrison-Saunders, Angus. 1996. "*EIA Auditing to Determine Environmental Management Performance*" Eco-Management and Auditing, Vol. 3, pp. 21-25.

Keywords: methodology, Australia, auditing. **Description:** This article presents a framework for EIA auditing in Australia. It focuses on the environmental management outcomes of projects that have undergone EIA.

5.4 United Kingdom

Beanlands, G.E. and P.N. Duinker. 1984. "*Lessons From a Decade of Offshore Environmental Impact Assessment*" Ocean Management, Vol. 9, No. 3-4, pp. 157-175.

Keywords: offshore development, prediction, US, UK, Canada. **Description:** The approaches of three nations to EIA for offshore development are compared. Topics of discussion include the difficulties of impact prediction and monitoring, and the lessons learned after more than ten years of experience.

Bisset, Ronald. 1984. *"Post-Development Audits to Investigate the Accuracy of Environmental Impact Predictions"* Zeitschrift für Umweltpolitik, Vol. 4, No. 84, pp. 463-484.

Keywords: UK, case studies, predictions, US experience. **Description:** Research results of four case studies in the UK are analyzed, as well as the problems which may arise when carrying out an audit. The implications of audits on future EAs is examined.

Clark, B.D. and R. Bisset and P. Tomlinson. 1985. *"Environmental Assessment Audits in the UK: Scope, Results and Lessons for Future Practice"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 519-540.

Keywords: UK, case study, baseline data. **Description:** This paper discusses the potentially important role monitoring could play in improving EA systems generally. The different types of audits are identified and explained.

5.5 Antarctica

Kennicutt, Mahlon C. et al. 1996. *"Monitoring of Environmental Impacts from Science and Operations"* Prepared for The Scientific Committee on Antarctic Research and The Council of Managers of National Antarctic Programs.

Keywords: Antarctica, case study, methodology. **Description:** The paper identifies the importance of establishing an improved monitoring program in Antarctica. Some case studies are examined to illustrate the above point. As well, a framework or methodology is laid out to suggest how to properly carry out a monitoring process.

5.6 Hong Kong

Assessment and Audit Group: Hong Kong Government. 1996. *"Environmental Monitoring and Audit of the Airport Core Programme Projects in Hong Kong"*

Keywords: methodology, Hong Kong, case study, terminology. **Description:** This report presents the environmental monitoring and audit system used in Hong Kong for the airport core program. Methodology, findings, and case illustrations are discussed.

Au, Elvis W.K. 1995. *"EIA Follow up Monitoring and Management"* International Study of the Effectiveness of Environmental Assessment. Environmental Protection Department: Hong Kong.

Keywords: cumulative effects, cost-effectiveness, SEA, Hong Kong. **Description:** This document outlines the various roles in the monitoring process, as well as what has been done in practice in different jurisdictions, and what should be done during this phase of environmental impact assessment. The paper also focuses on practical issues that may be encountered during the follow up process.

Environmental Protection Department: Hong Kong Government. 1996. *"Generic Environmental Monitoring and Audit Manual"*

Keywords: Hong Kong, air quality, water quality, waste management. **Description:** This is a guide to be used by EIA consultants to ensure compliance with EIA study recommendations to assess the effectiveness of the recommended mitigation measures. It aims to provide systematic procedures for monitoring and auditing.

5.7 Africa

Kakonge, John. 1994. *"Monitoring of Environmental Impact Assessments in Africa"* Environmental Impact Assessment Review, Vol. 14, No. 4, pp. 295-304.

Keywords: Africa, pre-project, case examples. **Description:** This article examines the extent to which the projects subject to EIAs in Africa have been adequately monitored. The paper concentrates more on the earlier stages of the monitoring component of EIA.

6.0 Cumulative Environmental Effects

Davies, Katherine. 1991. *"Monitoring for Cumulative Environmental Effects: A Review of Seven Environmental Monitoring Programs"* Second Draft prepared for The Federal Environmental Assessment Review Office and Environment Canada.

Keywords: cumulative effects, CEAA, case studies, methodology. **Description:** This paper discusses suggestions of how environmental monitoring programs can address cumulative environmental effects as well as to provide advice to program managers on how environmental monitoring programs can take into account cumulative environmental effects. Some examples are examined to further illustrate the point.

Everitt, Robert R. 1992. *"Environmental Effects Monitoring Manual"* Prepared for the Federal Environmental Assessment Review Office.

Keywords: methodology, EEM, ecological approach, cumulative effects. **Description:** This manual provides guidance to the non-technically oriented manager responsible for the overall design and execution of EEM programs. It also describes a rationale for how to design effective EEM programs.

MacViro Consultants Inc. 1995. *"Cumulative Effects Monitoring Program for the Niagara Escarpment Plan Area"* Phase 2: Final Report.

Keywords: framework, Niagara Escarpment, cumulative effects. **Description:** This report presents the cumulative effects monitoring program for the Niagara Escarpment.

Munn, R.E. 1994. *"The Design of Long-Term Environmental Monitoring Programs for CEAs"* The Inclusion of Long Term Global Futures in Cumulative Environmental Assessments: Environmental Monograph No. 11, Ch. 6, pp. 53-61.

Keywords: model, cumulative effects, ecosystem approach, VECs, case examples.
Description: This chapter discusses two important goals of an EIA or CEA monitoring program. It examines the accuracy of predictions and the goal of an early warning that remedial action may be necessary.

7.0 Problems and Issues

Beanlands, G.E. and P.N. Duinker. 1984. *"Lessons From a Decade of Offshore Environmental Impact Assessment"* Ocean Management, Vol. 9, No. 3-4, pp. 157-175.

Keywords: offshore development, prediction, US, UK, Canada. **Description:** The approaches of three nations to EIA for offshore development are compared. Topics of discussion include the difficulties of impact prediction and monitoring, and the lessons learned after more than ten years of experience.

Berkes, Fikret. 1988. *"The Intrinsic Difficulty of Predicting Impacts: Lessons From the James Bay Hydro Project"* Environmental Impact Assessment Review, Vol. 8, pp. 201-220.

Keywords: audit, hydro project, ecosystem approach. **Description:** This document reviews some of the experience since 1971 with the James Bay project to evaluate the accuracy of predictions made, and to gain insight on how to improve the monitoring process.

Bissit, Ronald. 1980. *"Problems and Issues in the Implementation of EIA Audits"* Environmental Impact Assessment Review, Vol. 1, No. 4, pp. 379-398.

Keywords: compliance, baseline, case examples, US, NEPA. **Description:** The article briefly identifies the main objectives of monitoring. A case example is used to illustrate the many problems encountered when monitoring is administered.

Blodgett, J. E. 1979. *"Environmental Monitoring"* The Library of Congress Congressional Research Service Major Issue System: Issue Brief No. IB78021.

Keywords: US, policy, baseline data, ambient monitoring. **Description:** The brief explores the problem of the absence of a monitoring program in the US. It examines some background information, problems / issues, and two basic schemes for creating an adequate national monitoring system.

Hobbs, Benjamin and E. Stakhiv and W. Grayman. 1989. *"Impact Evaluation Procedures: Theory, Practice, and Needs"* Journal of Water Resources Planning and Management, Vol. 115, pp. 2-21.

Keywords: water planning, evaluation, methodology. **Description:** This paper identifies the need for an improved evaluation procedure.

McCallum, David R. 1985. *"Environmental Follow-Up to Federal Projects: A National Review"* Audit and Evaluation in Environmental Assessment and Management: Canadian and International Experience. Supporting Studies, Vol. 2, pp. 731-749.

Keywords: federal projects, methodology, Canada. **Description:** This paper draws on interviews with EIA practitioners to examine overall perspectives on the status of follow-up and to identify factors which encourage or impede different types of follow-up. Some suggestions are discussed as to what should be taken into account when planning follow-up activities.

Munn, R.E. 1993. *"Monitoring for Ecosystem Integrity"* Ecological Integrity and the Management of Ecosystems, St. Lucie Press, pp. 105-116.

Keywords: ecosystem integrity, sustainable development, ecosystem approach.

Description: This chapter explores the problem of designing a system to monitor ecosystem integrity. It provides criteria for formulating such a system keeping in mind the ecosystem approach.

Rigby, Bruce. *"Post-Development Audits in Environmental Impact Assessment"* New Directions in Environmental Impact Assessment in Canada, Methuen. Edited by V. Maclaren and J. Whitney.

Keywords: case study, public involvement, recommendations. **Description:** This paper examines reasons why monitoring has not become common at the federal level in Canada. It also discusses the current state of post-development audits in Canada by analyzing case studies.

8.0 Public Participation

Banks, N. and A.R. Thompson. 1980. *"Monitoring for Impact Assessment and Management: An Analysis of the Legal and Administrative Framework"* Prepared for the Economic Council of Canada.

Keywords: public participation, legal requirements, framework. **Description:** This study examines the nature of major development projects and the problems they present for impact assessment and decision-making. The function of monitoring is discussed as well as the legal and institutional requirements of an effective monitoring program.

Burdge, Rabel and R.A. Robertson. 1990. *"Social Impact Assessment and the Public Involvement Process"* Environmental Impact Assessment Review, Vol. 10, pp. 81-90.

Keywords: public involvement, methodology, SIA. **Description:** The aim of this paper is to discuss the concept of public involvement and the role that it plays in SIA. It also deals with the rationale and methodology for public involvement.

Gariépy, Michel. 1991. *"Toward a Dual-Influence System: Assessing the Effects of Public Participation in Environmental Impact Assessment for Hydro-Quebec Projects"* Environmental Impact Assessment Review, Vol. 11, pp. 353-374.

Keywords: case studies, Hydro-Quebec, decision-making. **Description:** This paper analyzes public participation in the EIA process for five projects initiated by Hydro-

Quebec. The aim is to determine how much and or what public involvement actually achieves.

Stokes, P. and M. Havas and T. Brydges. *"Public Participation and Volunteer Help in Monitoring Programs: An Assessment"* Prepared for Environment Canada.

Keywords: public involvement, case studies. **Description:** This paper outlines some examples where the public has been involved in the monitoring process. The report also evaluates the examples, and then summarizes some of the benefits and disadvantages of this approach.