

Richibucto Environment and Resource Enhancement Project: An Ecosystem Approach for Developing a Model of Integrated Coastal Zone Management in Atlantic Canada

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ABSTRACT: The Richibucto watershed covers approximately 1300 km² and is located in New Brunswick, Canada. The Richibucto estuary and its associated river system have always played an important role in the lives of those communities that reside along its shores. Over the years many of the natural finfish and shellfish stocks have become jeopardized, and in some instances totally depleted. Increasing habitat destruction has resulted in significant portions of the estuary becoming permanently or conditionally-closed to shellfish aquaculture and harvesting. In 1996 the University of Moncton in collaboration with local communities and support from other scientists as well as government and voluntary organizations, undertook a major environmental study of the Richibucto waters. This multi-community investigation consisted of two phases: Phase 1 identified factors that contributed towards the deterioration of the aquatic environment, proposed certain rehabilitative measures to address and correct problems and applied newly-gained information in helping to develop strategies that could contribute towards enhancement and aquaculture development of certain species. Phase 2, initiated in the spring of 2001, focuses on developing a thorough and integrated investigation of the economic carrying capacity of the Richibucto estuary for shellfish aquaculture. The latter is structured around four components: i. Oceanographic modeling, ii. shellfish farming at a commercial test site, iii. environmental health and iv. participatory coastal zone management. We anticipate that the program will contribute to long-term social, recreational and sustainable economic benefits for the residents of the area and ultimately serve as a model for other watersheds in Atlantic Canada

1. INTRODUCTION

1.1. Background to study

The Richibucto watershed covers approximately 1300 km² and is located in New Brunswick, Canada. The Richibucto estuary and its associated river system have always played an important role in the lives of those communities that reside along its shores. The people depended on the waters for subsistence, recreation, transport and different capture fisheries. Over the years many of the natural finfish and shellfish stocks became jeopardized, and in some instances totally depleted. Increasing pollution resulted in significant portions of the estuary becoming permanently or conditionally-closed to shellfish harvesting.

1.2. Study

The Environmental Sciences Research Centre (ESRC) of the Université de Moncton in collaboration with local communities, government agencies and voluntary organizations, undertook a major environmental study of the Richibucto waters. This multi-stakeholder, multi-disciplinary investigation, which became known as the Richibucto Environment and Resource Enhancement Project was initiated in early 1996 and consisted of 2 phases. The Richibucto Environment and Resource Enhancement Project is one of the programs that falls under the Canada-German Bilateral Cooperation Agreement in Science and Technology in the field of

Integrated Coastal Zone Management, whose German Coordinator is Professor Harald Rosenthal of the University of Kiel, Germany.

2. RICHIBUCTO ENVIRONMENT AND RESOURCE ENHANCEMENT PROJECT

2.1. Phase 1

Phase 1 (1996 -2001) identified factors responsible for the deterioration of the aquatic environment, proposed certain rehabilitative measures to address and correct problems and applied newly-gained information in helping develop strategies that contributed towards enhancement and aquaculture development of certain targeted species. The specific lines of research were defined after public consultations were held in early 1996 with the various stakeholder communities (including French, English and several MicMaq First Nations), representatives of the aquaculture and fishing industries, environmental groups and government and university scientists.

A management scheme was established consisting of a Steering Committee, an Executive Council, a Technical Advisory Committee and four Working Groups.

The mandates of the Working groups were as follows:

- i. Collaboration with First Nations and with Industry
- ii. Environmental Monitoring
- iii. Environmental and Applied research
- iv. Training, Graduate Research and Advice to community groups

Numerous sub-projects formed part of Phase 1, some of which included: monitoring of water quality, studies of various oceanographic variables, identification of sites for oyster culture, exploring the possibilities for culture of new shellfish species, the effects of introduction of peat particles into the Richibucto estuary, studies on the ecology of striped bass, studies on the presence and the effects of parasites of shellfish and work related to the impacts of over-wintering of surf clams and ice restrictions on grow-out opportunities.

2.2. Phase 2

Phase 2 (2001-2006) was initiated last year and drew on previous experience and recorded findings resulting from the work performed during Phase 1. The current work focuses on:

- i. undertaking a thorough and integrated investigation of the economic carrying capacity of the Richibucto estuary for shellfish aquaculture and
- ii. developing a knowledge-base model for the shellfish culture industry in Atlantic Canada.

2.3. Four Thematic areas

The project is built around four major themes:

- i. oceanographic modelling,
- ii. shellfish farming,
- iii. environmental health and
- iv. participatory coastal zone management.

2.3.1. Oceanographic modelling

The modelling component is expected to provide a new paradigm for aquaculture development in the region. It will permit the establishment of an effective predictive tool kit to be used in supplying information on optimal site selection, proper farm configuration for desirable economic growth and a clearer definition of the role of sustainable bivalve culture in a healthy ecosystem. The work includes detailed hydrodynamic studies of circulation and flushing patterns, accompanied by comprehensive work on suspended particulate matter, primary production, rates and levels of deposition and resuspension, benthos and larval recruitment, as well as many other variables.

2.3.2. Shellfish system-oyster culture operation

The modelling component will reveal the economic sustainability of the watershed at the macro level, and will be implemented and tested at a specific oyster culture operation (micro level) that was established in the spring of 2001 and which will be expanded over the next 5 years. The information generated for this site will be combined with a detailed economic and marketing study, and simulation models based on realistic scenarios will be used to contribute towards profit maximization of the operation. Investigations related to the optimization of oyster production and the evaluation of alternate techniques for over-wintering will represent the thrust of this component.

2.3.3. Environmental Health aspect

Monitoring of environmental impacts will "test the pulse of the system" during the course of the program and will depend on the use of bivalve biomarkers, physiological indicators and comparative studies employing indices of biotic integrity sampled from various sites throughout the Richibucto Estuary.

2.3.4. Participatory coastal zone management

Finally, a comprehensive Integrated Coastal Zone Management plan (ICZM) is being developed to reduce conflict and facilitate consensus building for all resource users of the region. The approach, which we hope will ensure long-term social, recreational and sustainable economic benefits for the residents of the area, will hopefully also serve as a model for other watersheds.