GREAT LAKES FISHERY COMMISSION
Research Completion Report *

GREAT LAKES POLICY EXERCISE
Lake St. Clair Feasibility Study
Project Completion Report

orig
To copy
from

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I. Introduction

Large-scale, long-term interactions between development and the environment are particularly difficult to understand and control, without international and interdisciplinary efforts involving both policy people and scientists. Issues such as water quality management ("how clean is clean?") or water quantity management ("how should we manage fluctuating lake levels") are trans-disciplinary. Resolution of these types of problems requires an understanding of the underlying values and beliefs of society in addition to scientific, economic, and technical considerations. The greatest promise for producing new knowledge about such issues lies in this area of collaboration between the disciplines and in synthesis of research efforts in interdisciplinary work.

Efforts to deal with such issues have resulted in the development of procedures that encourage the integration of existing scientific and institutional perspectives (for example, Environmental Impact Assessment, Social Impact Assessment, Cumulative Effects Assessment). It is also becoming increasingly evident that knowledge resulting from this work must be shared with and linked to the needs and values of society and the subsequent actions of the policy community. Finally, the impacts and sources of control in these issues are independent of local, regional, and national boundaries, requiring collaborative research and problem solving between the representatives of interdependent jurisdictions. The policy exercise has been proposed as a new method for accomplishing this collaborative effort.

II. Background

The concept for the Great Lakes Policy Exercise originated in work that began in 1984 under the direction of William C. Clark, who was then director of the project on "Ecologically Sustainable Development of the Biosphere" at the International Institute for Applied Systems Analysis (IIASA) in Laxenburg, Austria. It was felt that there was a need for a different methodological approach in arenas where the issues involve large-scale, long term interactions

between development and environment (such as global climate change and acid rain). Yale researcher Gary Brewer [Brewer, 1986] developed the concept of the policy exercise in response to this perceived need, proposing the use of scenarios in a free-form gaming situation (much as the military uses scenarios and war games to "play out" alternative strategies). The emphasis of the policy exercise is placed on strategic planning - on providing a better understanding of the forces and causal links present in a hypothetical situation (the scenario) to better prepare policy makers and scientists to handle such situations if and when they actually do come about. If the hypothetical situation presented in the scenario is plausible and credible, it will influence policy maker's day to day (tactical) decisions as well, towards consideration of more long-term, regional or global scale forces and conditions.

While Brewer's concept paper is useful in that it outlines the potential application of a policy exercise, it includes only preliminary suggestions for design and implementation. Several research groups have been involved in further definition and testing of the policy exercise concept. Early tests of the concept were performed at IIASA in 1986, including the potential use of teleconferencing in the policy exercise [Toth, 1986; and Underwood and Toth, 1987]. In November, 1987, a refined version of the policy exercise was presented to members of the Forest Study of the Biosphere Project in Laxenburg, Austria. Two members of the Great Lakes Policy Exercise project team were invited to participate in the policy exercise as facilitators (Branson and Underwood).

In December, 1986, the concept of the Great Lakes policy exercise was put before the Great Lakes Fishery Commission for consideration as a potentially useful approach to strategic planning at the Lake Committee level. Specifically, it was felt that the policy exercise procedure would assist Lake Committees in development and implementation of fish community goals and management objectives. Development of fish community goals and objectives is required by the Committee of the Whole, in the Strategic Great Lakes Fishery Management Plan [Committee of the Whole, 1980].

Because the Commission had a number of alternative proposals to consider in the areas of policy development and expert systems, a special workshop was held in February, 1987 to discuss possible synergism between the alternative approaches. As a result of this workshop, it was decided that the concept of the policy exercise merited further consideration, but that more work was needed to define the methodology, and to identify potential participants who would be willing to participate in a trial-run version.

Following peer review of the proposal by the Board of Technical Experts, funding was granted by the Great Lakes Fishery Commission to the School of Natural Resources, University of Michigan and Community Systems Foundation of Ann Arbor, Michigan. Work on the project commenced in March, 1988, and was completed in June, 1989.

III. The Policy Exercise: Description and Methodology

Description

The policy exercise procedure proposed by the IIASA group is a systematic process that presents and clarifies alternative futures in scenario form, elicits possible policy actions from participating policy makers, and explores the ramifications of those policies through discussion with scientists and technical experts. Existing quantitative and qualitative data are used when available, or simulated if need be. Results are presented to participants in a policy briefing document, including possible future scenarios, alternative actions, and evaluations of those alternatives made by both scientists and policy makers. The significance of the policy exercise is that it promotes an explicit interdisciplinary and collaborative method for thinking about "what if" decisions, including the assumptions and values that are implied in making them.

Methodology: The Policy Exercise Process

As it was initially presented to the Great Lakes Fishery Commission, the proposed Great Lakes policy exercise would include a pre-policy exercise phase performed by the policy exercise convenors, three phases of the exercise that involve participant groups of scientists and policy makers, and post policy exercise debriefing work performed by convenors (Figure 1).

Background work performed by the policy exercise convenors includes preliminary scoping and bounding of the issues at hand, identification of key issues, selection of participants for the science and policy groups, and establishment of the geographic focus of the exercise including identification of relatively homogeneous regions. Examples of scenarios that could be used in a policy exercise workshop are drafted. Much of the work presented in this report serves as an illustration of the type of background information that would be prepared for a Lake St. Clair Policy Exercise.

The first phase of the actual policy exercise involves a group of scientists, policy advisors, and technical experts in a review of the scenario or sets of scenarios along with background information such as technical reports, models, databases. For example, fishery scientists could be involved in developing scenarios dealing with lake level regulation, introduction of exotic species, a ban on the use of TFM for sea

lamprey control, or a major chemical spill in the St. Clair Flats region of Lake St. Clair. Scenarios are intended to be realistic portrayals of possible future settings and decision points, including surprises or unexpected events. The science group also develops a cause-effect model intended to use in assessing impacts of the policy options developed during the second phase of the policy exercise. Based on the cause-effect model, key information is identified, including gaps or areas of uncertainty. In areas where information is lacking or uncertain, the science group will establish a means for providing expert opinion, such as the use of a Delphi survey of recognized authorities. Phase 1 of the policy exercise can take one or more days, depending on the complexity of the scenarios and the availability of information.

The second phase of the policy exercise involves discussion of the scenarios by a second group of participants (policy makers or advisors). Phase 2 of the policy exercise usually happens in a "workshop" format. Policy initiatives and options are discussed between participants in small groups, allowing the participants to discuss areas of potential conflict and collaboration.. Typically, two to three rounds of small group discussion are held, providing an opportunity for participants to discuss options (1) within disciplines (for example, fishery managers or city managers); (2) across disciplines (for example, regional managers within a particular geographic area, such as Anchor Bay or St. Clair Flats); (3) across regions (for example, an open session to discuss policy options for the whole lake). These small group discussions typically require one to two hours apiece. At the end of the discussion period, the policy group members submit decisions on policy initiatives they might reasonably undertake, including objectives, goals, benefit/cost implications, sources of funding and other considerations.

In the third phase, the science group (perhaps in conjunction with the policy makers) discusses the policy initiatives and the possible impacts of the actions, using the cause-effect model as a framework for discussion. They use the best available simulation models to project impacts (for example, models for the Integrated Management of Sea Lamprey. At this point, scientists typically discover and discuss weak points in current information and in the models available to assist policy makers. The science group may convene Delphi survey panels to provide expert opinion in cases where the underlying information is uncertain or lacking. This phase of the policy exercise is usually started immediately following phase 2 (so that scientists can clarify the intentions of the policy group, if need be). Completing phase 3 can take

several hours to several weeks, depending on the availability of information required to assess impacts of the policy initiatives. A second generation of the scenario is ultimately produced that projects one or more likely results - taking another step into the future.

Phases 2 and 3 could be cycled through several times in subsequent workshops, to take the thinking of the participants several decades forward in time (although the scenarios tend to become much more hypothetical after two generations). Following the policy exercise workshops, a debriefing session is held by the convenors to summarize the scenarios, policy alternatives generated, and to provide an evaluation of those alternatives in a strategic policy briefing document. This session may be attended by the participants if desired.

This model of the policy exercise is an adaptation of the version used in the tests with the IIASA Forest Study Advisory Committee in 1987.

IV. Great Lakes Policy Exercise - Lake St. Clair Feasibility Study

Proposal Scope:

In order to further develop the methodology for the policy exercise as it pertains to fishery interests, it was decided to focus on a particular area of the Great Lakes and to select a particular ecosystem level issue for further exploration and development. Lake St. Clair was selected as a study area for the following reasons:

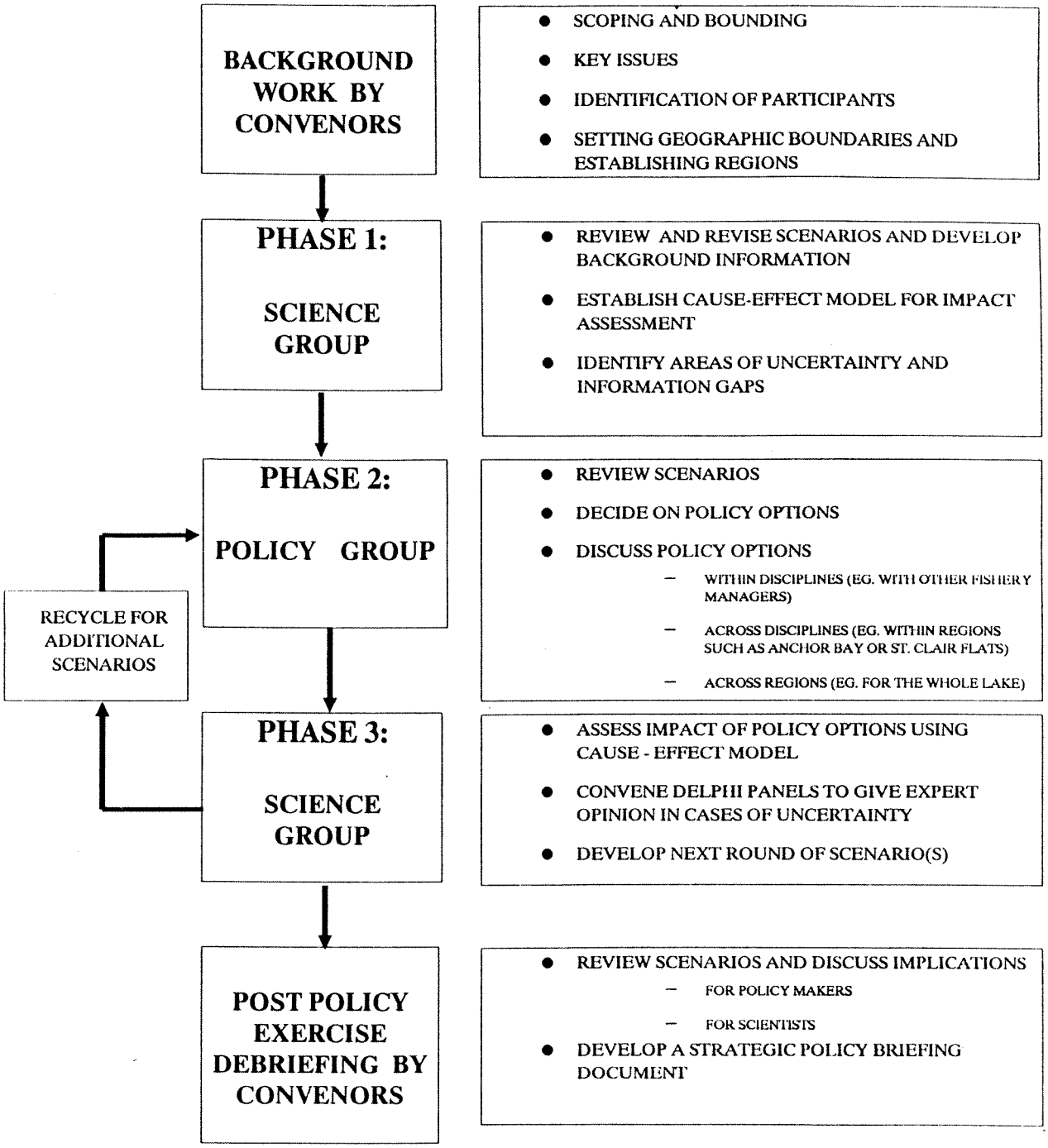
(1) the multiple and competing jurisdictions governing resource use in this water system mirror, on a reduced scale, concerns and policy issues apparent on most of the other lake and channel systems;

(2) it is a well-studied system, with a wealth of data available on issues suitable for development of the policy exercise (for example, information on sport and commercial fishing interests, xenobiotic contamination, dredging, winter navigation, lake levels);

(3) it offers the opportunity of working with both Canadian and U.S. interests, providing a diverse yet manageable set of jurisdictions (as compared with other regions of the Great Lakes);

(4) its proximity to Ann Arbor reduced travel time and associated expenses.

FIGURE 1
THE POLICY EXERCISE PROCESS



The project team chose the topic of fluctuating lake levels as a focus for interviews with potential policy exercise participants. There is increasing awareness of the importance of this issue among fishery managers and other key decision makers (for example, the International Joint Committee Water Level Reference Study). Much research has been done and will continue to be done on the long term impact of water level fluctuations and on alternative strategies for resource management. Moreover, resource managers are searching for means to share the knowledge that is currently held by several agencies both within and among other agencies and with the general public. Finally, resource managers are search for new forums that provide an opportunity for discussing policy options among groups that may have conflicting objectives with respect to lake level management. For example, shipping and electric power utilities generally benefit from higher water levels, homeowners generally prefer lower levels to minimize risks of flood damage (although not so low as to impede access), and natural resource managers generally prefer to maintain the natural fluctuation that preserves and protects wetlands and near shore spawning beds.

Project Scope

The Lake St. Clair Feasibility Study included the following activities:

- assessment of the feasibility of performing the policy exercise
- statement of the goals of the policy exercise
- list of potential participants in a policy exercise
- evaluation of the need for selection and/or development of relevant software
- evaluation of the need for/desirability of remote teleconferencing capability
- draft examples of initial scenarios which could be used in a policy exercise.

Additionally, on the advice of the Great Lakes policy exercise Advisory Committee, the project team decided to test a modified pilot version of the policy exercise in a classroom setting. The Practicum "Lake St. Clair: Exploring an Integrated Approach to Lake Level Management" was offered as part of the Master's level course at the School of Natural Resources, University of Michigan in April, 1989. This course is NR 502 (Integrated Problem Solving). Results are discussed in the section below.

V. Project Report: Findings and Observations

Scoping Interviews

Potential candidates for participation in a Lake St. Clair Policy Exercise were identified through a snowball interviewing technique (interviewees were asked for referrals to other potential candidates). Interviews were semi-structured, using the interview format shown in Appendix A. The interviews were typically 1 to 2 hours in length, except for a few interviews held by telephone. Names and affiliations of those interviewed, as well as other potential candidates referred to in interviews, are shown in Appendix B. Interviews were held with 11 potential candidates for the Science and Technology Group and 18 potential candidates for the Policy Group.

Observation

There is a high level of interest in holding a policy exercise to discuss responses to fluctuations in lake level. All persons interviewed would be willing to participate in a policy exercise. Two individuals said that it would need to be made clear why representation from their organizations would be important and constructive. Other results from the interviews are summarized in the sections below.

Identification of Key Decision Makers

Interviewees were asked to identify names and affiliations of key decision makers regarding the Lake St. Clair ecosystem. In decreasing order of frequency, the organizations identified are:

International Joint Commission

U.S. Army Corps of Engineers

Michigan Department of Natural Resources

Ontario Ministry of Natural Resources

Great Lakes Fishery Commission

Native American Tribal Agencies

Michigan United Conservation Clubs

Ontario Federation of Anglers and Hunters

Lake St. Clair Advisory Committee

Elected Representatives from the Geographical Area

Huron-Clinton Metropolitan Authority

Observation

Adequate representation from these key policy making groups is essential to the success of a future policy exercise.

Identification of Key Issues

Interviewees were asked to identify specific policy concerns regarding fluctuations in lake levels. In decreasing order of frequency, key issues identified are:

Degree of controllability (seasonal or extreme fluctuations, impacts of human intervention vs. natural system fluctuations)

Dredging and disposal of spoils

Winter navigation

Fish community management (stocking, catch limits, migration into and out of the lake)

Boating (density, dock and marina issues, safety, access, motor vs. sail, fishing vs. recreational use)

Non-Point source pollution

Preservation and restoration of the ecosystem

Public vs. private access to the lake

Zoning and use permits, development issues

Climate change (impacts on ecosystem, water temperature effects, ice jams, fish community objectives, winter navigation)

Lack of coordination of planning & response (State, Provincial and Federal Levels)

Observation

These are examples of key issues that could be addressed in scenarios presented in the scenarios for a policy exercise.

Lake St. Clair Policy Exercise - Scenarios and Test of Pilot Version

1. Preliminary Scenarios and Feedback from Advisory Committee

At a meeting held in December, 1988, members of the Great Lakes Policy Exercise Advisory Committee were presented with a framework for design of a Lake St. Clair Policy Exercise and outlines of three scenarios (high lake levels, low lake levels, and extreme seasonal fluctuations). Additionally, they were presented with an outline of a scenario based on predicted impacts of global climate change (greenhouse effect and global warming trends). Feedback from the Committee included recommendations to:

- o keep the scenarios as simple as possible
- o use references to lake levels that people can identify with past personal experience (e.g. low lake levels in 1965, down 1-2 feet from present level)
- o minimize emphasis on global climate change since it is a topic that the experts are currently debating.

The Committee also endorsed the recommendation of the project team that a pilot policy exercise be developed and tested in a classroom setting at the University of Michigan. The results of the pilot policy exercise are discussed in the following section.

2. Pilot Policy Exercise - University of Michigan

Process

The pilot policy exercise was offered as a practicum component of the Master's level course in Integrative Problem Solving in the winter semester, 1989. The Charge to Participants is shown in Appendix C-1. The main goals of the exercise were:

(1) to provide practical experience in interdisciplinary integration between and within 5 representative resource management groups (Fisheries and Wildlife, Industry and Shipping, Recreational Use, Land Use, and Development)

(2) to explore means of performing integrated impact assessment using the scenario-based method of the policy exercise for high and low lake level scenarios

(3) to explore the impact of remote teleconferencing on discussions between resource management groups

(4) to explore the use of conflict management as an integrative tool by attempting to define a consensus process for discussion policy options at the whole-lake ecosystem level. This objective was accomplished by a modification to the policy exercise format that required participants to identify and prioritize highly impacted zones in addition to identification of key policy issues and policy recommendations.

Thirty-one students elected to participate in the exercise. The practicum took place in one four-hour session. Due to the time constraint and multiple goals for the policy exercise the design of the policy exercise workshop as described above was substantially modified. Students performed only a preliminary policy exploration based on their discussion of two abbreviated scenarios (shown below). The scenarios were shortened so that they could be read and discussed within a half-hour time frame. High and low lake level scenarios were chosen, since they generate the most potential conflict between the 5 resource management groups. Students were given background reading materials relevant to their assigned areas of resource management, taken primarily from The St. Clair River and Lake St. Clair, Michigan: An Ecological Profile [Edsall and others, 1988]. Instructions to the Participants and the worksheets used by the students to record their decisions are shown in Appendix C-2. Each resource group was also given a detailed map set showing the impacted shoreline areas for high and low lake scenarios, based on map sets of the lake provided by the Land and Water Management Division of the Michigan Department of Natural Resources. An example of the map detail used is shown in Figure 2. The two scenarios used are as follows:

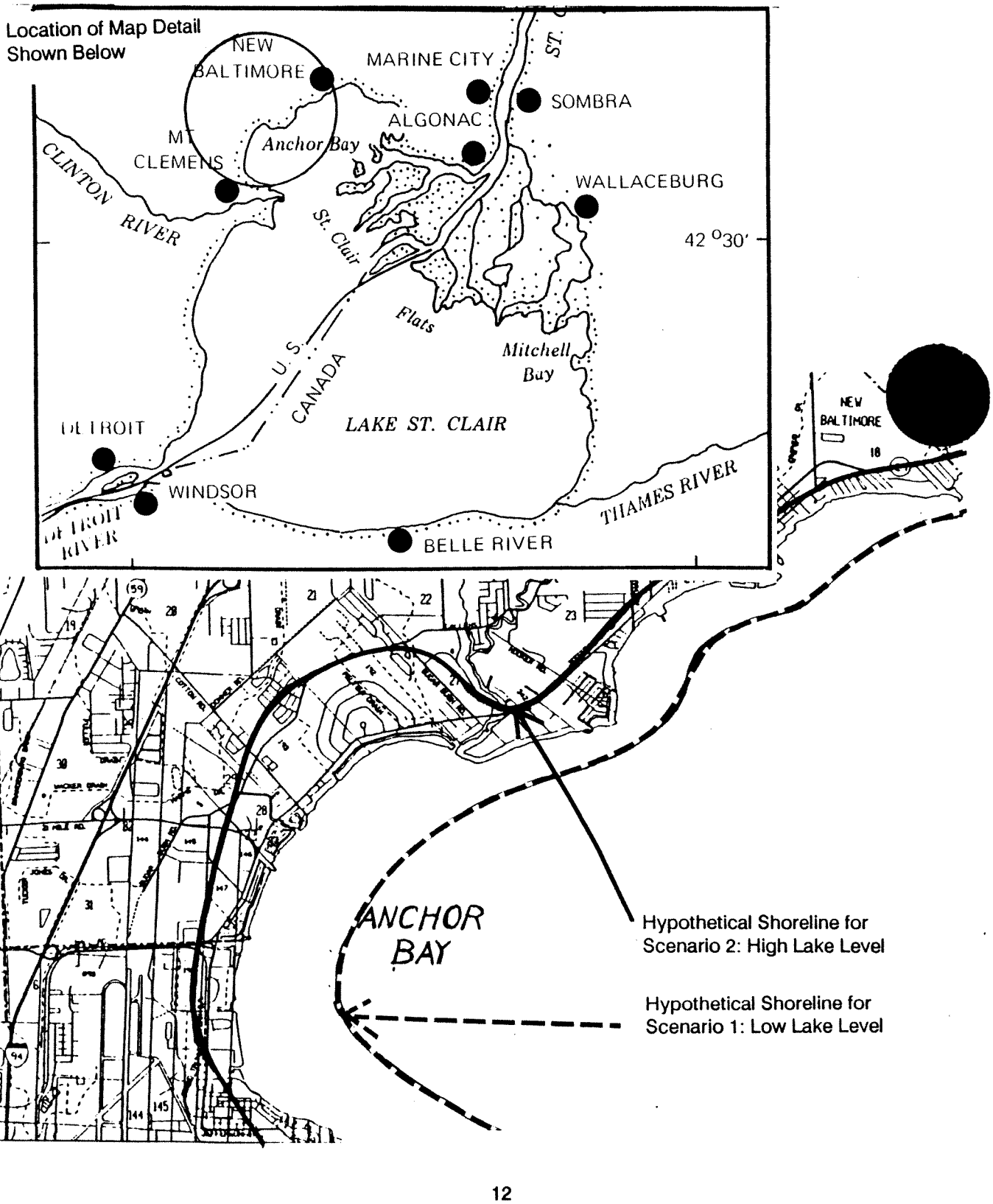
Scenarios for Practicum IV-C Lake St. Clair: Exploring an Integrated Approach to Lake Level Management

Background for Both Scenarios

The year is 1995. Atmospheric scientists have noted a gradual rise in CO2 as predicted. There appears to be an overall trend towards global warming, although there is still disagreement in the scientific community over the ultimate cause and effect of this apparent trend (for example, effects may be obscured by a countering glaciation effect).

FIGURE 2

EXAMPLE OF MAP DETAIL USED IN THE LAKE ST. CLAIR POLICY EXERCISE



Nationally, the southwestern U.S. has experienced an extended series of droughts which has depleted available groundwater sources. Water diversion projects that had seemed impractical in the past (such as the Canadian Grand Canal proposal) are being seriously discussed by federal decision makers. Virtually all of the diversion proposals would result in less water flowing into Lake Superior, which would ultimately result in reduced flow through the Great Lakes system.

In the Great Lakes region, transition of heavy manufacturing industry to more "high-tech" forms (electronics, robotics, and light manufacturing industry) has continued. Industry has increasingly decentralized, in response to the "just in time" inventory needs of the automotive plants that were built in the last decade. Most job growth has taken place in office work and related service industries. This shift, plus completion of the I-696 corridor through the northern suburbs of Detroit has resulted in substantial population growth in the Mt. Clemens/Anchor Bay area. Demand for residential and office space has skyrocketed in these areas, especially for lake shore property.

In Detroit, programs and promotions by Wayne State University and the Harper-Grace hospital complex have created a beltway of urban renewal around the Renaissance Center area. Free trade instituted with Canada in the late 1980's has resulted in a gradual merging of the downtown communities of Detroit and Windsor. There is talk of building another bridge or tunnel north of the existing ones to carry the extra traffic flow.

Scenario 1: Low Lake Levels

As predicted in the mid-1980's, the shift in global climate has resulted in a gradual lowering of average lake levels. While there continue to be seasonal variations of 1 - 2 feet, the average level has dropped approximately 5 feet, and there are predictions of an additional 3 - 5 foot drop over the next decade.

The lower lake level has resulted in increased channelization of the lake, especially in the St. Clair Flats (delta) area. In an attempt to keep shipping lanes open, the U.S. Army Corps of Engineers has instituted a program of continuous dredging in the shipping lanes. They have been unable to keep up with requests from recreational boaters and marinas, so these groups have had to resort to private contractors to keep the docks open. There is great concern throughout the lake community about disposal of dredge spoils, given that much of the sediment in the St. Clair Flats area is contaminated by chemical discharge from industry located in the Chemical Valley area.

Shipping industry is greatly concerned that lower levels in the Great Lakes system as a whole could eventually result in a total shutdown of shipping, since the Canadian locks at Lake Ontario would cease to function if the lake levels fall even another 2 - 3 feet. Shippers are also increasingly concerned with traffic safety issues as the freighters share shrinking channel space with growing numbers of recreational boaters. Sail and power boaters are frequently at odds as navigable docking space becomes scarce.

Biologists have noted an overall loss of submerged aquatic vegetation and wetlands. Although some new areas are emerging as the shoreline is exposed, much of the new land is prime for development. This is especially important for the economy of the area, since the Great Lakes region is now viewed as prime for re-industrialization as the southwest states run out of fresh water. Use of the emerging wetland areas for hunting and fishing is increasingly difficult to justify economically.

Water intake structures for several communities along the lake are in danger of being exposed, and will need to be replaced. There is growing concern over water quality issues, since decreased flow through the system results in an increased concentration of contaminants. There is increasing public pressure for stiffening discharge permit requirements for point source discharges in Chemical Valley, and for imposing new constraints on non-point sources such as pesticide and fertilizer run-off from agricultural lands.

Scenario 2: High Lake Levels

Increased precipitation from global warming trends has resulted in an overall increase of water in the Great Lakes system. The predicted offset due to an increase in evaporation has not occurred (possibly due to increased cloud cover and shifts in the jet streams that have resulted in an overall cooling effect).

As a result, average lake levels in Lake St. Clair have gradually risen an average 3 - 5 feet higher than normal. This has resulted in substantial flood damage to communities along the lake shore, especially in the Mt. Clemens/Anchor Bay area, where development boomed along the shore line during the late 1980's. The Army Corps of Engineers has been besieged by communities asking for help, but no funds are available from the federal government for large-scale, long term solutions. Independent contractors are working with individual property owners as well as with communities along the lake to install sea walls, berms, and other physical barriers in an attempt to protect property from flooding. A growing number of property owners are demanding relief, even to the extent of backing diversion schemes to ship water to the southwest U.S.

Much of the wetland in the St. Clair Flats area has been totally submerged. Some new wetland areas are gradually emerging inland, but many acres have been totally lost. Also, higher water levels have made marshes and wetland areas much more accessible to recreational boaters, resulting in increased damage to habitat.

Shipping is enjoying a come-back as an industry on the Great Lakes, especially since the free-trade pact with Canada has resulted in an economic alliance to promote U.S. and Canadian goods internationally. A large container port is planned for the Detroit/Windsor harbor area, which will allow the docking of much larger vessels.

Observations

Students spent the first hour of the exercise reading the scenarios and discussing impacts and policy options with other members of their assigned resource management groups. They then communicated with other resource management groups by using electronic mail messages sent through the Michigan Terminal System. There were frequent electronic interchanges between the groups as they attempted to come to consensus with the other groups primarily on the identification of the most severely impacted zones under the two scenarios. The facilitators acted as a clearing house for information about the opinions of the other groups, and periodically polled the groups about their decisions. Following the remote conference discussion, the groups adjourned to a conference room where they discussed their opinions and options "face-to-face," with the assistance of the facilitators. Each group presented its findings on identification of severely impacted zones and key policy issues. There was general agreement that Zone A - Anchor Bay and Zone D - St. Clair Flats would be highly impacted under both high and low water level scenarios (see map in Appendix C-1 for an illustration of the lake regions). Impacts on Zone B were felt to be critical to the Industry and Shipping Resource Management Group. Students were able to present only preliminary discussion of policy issues due to time constraints.

Two debriefing sessions were held. The first took place immediately following the policy exercise session, and the second took place four days later. Most of the discussion revolved around the perplexing issue of practical means for obtaining a "whole-lake" management plan given disparate resource management and geographical zone perspectives. Primarily, students were concerned that an approach of dealing with the worst cases first (based on a consensus of the most highly impacted zones/scenarios) would ultimately mire the discussion in details that would ultimate cause the loss of a whole lake ecosystem perspective. They agreed that a more helpful approach would be to hold regional policy exercise workshops simultaneously around the lake, followed by a "whole-lake" conference involving a representative group selected from the

regions. There were mixed opinions about the relative merits of remote vs. face-to-face discussions. Some students found it easier to communicate in a remote mode (less chance of being misinterpreted), and some greatly preferred face-to-face (more ability to communicate through non-verbal signals). There was general agreement that a blend of the two modes would probably be helpful. In general, the students felt that the policy exercise experience had been helpful in improving their understanding of the process issues underlying interdisciplinary planning and conflict management. They felt that the materials presented were clear and useful, but that they would ideally need a few more hours to adequately address the policy issues.

Assessment of Need for and Desirability of Microcomputer-based Software

The project team investigated three types of microcomputer based software that would potentially enhance the policy exercise process.

1. Cross-impact Models

The matrix method of defining cross impacts is a well established device. Matrices are especially useful in cases where both qualitative and quantitative information must be considered, and also where there is uncertainty in quantification of effects (as is the case with much of the lake level effects). Provision for analysis of qualitative information is essential for socioeconomic analysis (for example in evaluation of fishery and wetland resources), and for benefit/risk/cost assessment. Much of the analysis being undertaken for the IJC Water Levels Reference Study [IJC, 1989] lends itself to matrix (or spreadsheet) display. Other examples of cross impact models currently in use or under development include a trade-off analysis spreadsheet which is an integral part of the IMSL (Integrated Management of Sea Lamprey) Model [Koonce, 1989]; and food chain relations and direct effects of stress categories as discussed in a report on "Cumulative Impacts in the St. Clair-Detroit River System [Hudson and others, in publication]. Spreadsheet based software that lends itself to the cross-impact analysis technique is readily available commercially (such as Lotus 1-2-3, or Lucid 3-D from the Personal Support Group). Additionally, recent advances in software design allow spreadsheets to be linked to one another, providing a third dimension useful for relational analysis. Most software packages also provide "macros" that allow spreadsheets to be programmed to run other software programs (such as simulation models discussed below) from within the spreadsheet environment.

2. Simulations and Dynamic Models

Two types of simulation models would be useful in a policy exercise. One would simulate the physical environment (for example, lake levels given alternative control measures); the other

would simulate the ecological environment (given alternative environmental conditions; for example, temperature changes or chemical contamination).

Sophisticated hydrology models have been developed by the National Oceanic and Atmospheric Administration at the Great Lakes Environmental Research Lab. While the more sophisticated global models require large (mainframe) computers to run (such as the Global Circulation Model used to predict impacts of climate change), parts of models can be transported to microcomputers to provide "what if" analysis. For example, both GLERL and the U.S. Army Corps of Engineers have developed Hydraulic Routing Models. The GLERL model is available in a FORTRAN version capable of running on a microcomputer. The model basically predicts changes to lake levels given changes in parameters such as flows into and out of the lakes. The model could be linked with a cross-impact model described above, to allow users to change the parameters and run the model directly from a spreadsheet. The program is provided free by GLERL, but a FORTRAN compiler program is required to translate it to machine language. Microcomputer based FORTRAN programs are available for $200-$500 (for example, from Borland and Microsoft).

The availability of microcomputer based ecosystem dynamic models (for example, models of fish community structure and productivity) is more problematic. There are many gaps in currently available models which do not allow them to be directly applied to scenario development in an interactive workshop format. However, models are available which allow calculation of rough estimates of important parameters (for example, estimates of impact on fish yield based on area of submerged vegetation and temperature). These estimates could be used in a spreadsheet format (as in the cross-impact method described above) to qualitatively define regions of the lakes which would be more or less severely impacted under various scenarios. This would allow participants to determine which specific parameters in the models are most sensitive to policy objectives, and would also indicate which areas would be the most productive candidates for further research and definition in modeling. For example, the Anchor Bay and St. Clair Flats regions of Lake St. Clair seem to be particularly important regions for estimating impacts on fish and wildlife and recreational uses of the lake. Costs for development of computer models vary widely depending on the amount of work needed. The Adaptive Environmental Assessment and Management (AEAM) workshop approach to model development has been used for this purpose with some degree of success in the past [Minns, Cooley and Forney, 1984]. However, development of models can be time consuming and expensive, and participants don't always trust the results.

An alternative to developing and running a system dynamic model would be to provide advice from Delphi survey of a panel of experts, asking them to provide "educated guesses" for the

specific information required. The information could be displayed and used (with indications of uncertainty) in a cross-impact model. Costs for Delphi surveys also vary, depending on how many experts are involved, and whether they are donating services or require remuneration. The initial cost is likely to be lower than development of a model, but costs could escalate depending on how many "rounds" of survey are required. Use of a computer network or conference is initiated between the scientists (as discussed below), could help to minimize time and cost of a panel survey.

3. Geographic Information Systems

Geographic Information Systems (also called Land Information Systems) are systems that provide for the collection, storage, analysis, and display of spatially referenced data, such as is contained in maps, property descriptions, and environmental monitoring reports. Recent advances in microcomputer hardware and software have brought GIS capability within reach of most natural resource scientists and managers. Use of GIS systems is increasingly prevalent in natural resource management issues; for example, the IJC Lake Level Reference Project Management Team has recommended a GIS for use in analysis and visual depiction of the results of proposed actions.

The databases covering extensive areas such as the Great Lakes are at present too large for stand-alone microcomputer technology to handle (some files such as satellite based weather information are on the order of gigabytes in size, thousands of times larger than those currently accommodated on IBM-PC machines). Special technology is therefore required to store and display the information, and to break it down into files of a more manageable size which can be "downloaded" for display and further analysis in a microcomputer environment. For example, files for county level attributes such as land use, roads, land use, and vegetative cover descriptions typically run in the low megabyte range, and can be handled by suitably equipped IBM-PC compatible microcomputers. Currently, the approaches taken to GIS differ between the United States and Canada.

In the U.S., the Army Corps of Engineers is taking a lead coordination role (in cooperation with the Michigan Department of Natural Resources) in establishment of a GIS Center for the Great Lakes in the Detroit Region office. A commercially available software program (C-Map), developed by the Michigan State University Center for Remote Sensing, is available to reinterpret the mainframe Intergraph files into a format that can be displayed and further analyzed on an IBM-PC compatible microcomputer. These files can also be translated into formats compatible with

other commercially available GIS software packages such as PC-ARCINFO and ERDAS. However, assistance is required from the GIS Centers (such as the USACE Center, Michigan State University's Center for Remote Sensing, or through the Michigan Department of Natural Resources' Michigan Resource Inventory Program) in providing the files in a suitable size for microcomputers. If scenarios focus on a smaller geographic area, such as a township, county, or bay area, subsets of files could be readily developed that could be accessed in a microcomputer environment, at a cost of approximately $500 for the software and $5,000 - $10,000 or more for the hardware depending on options.

The Canadian GIS is also currently operated in a mainframe environment (the Canada Land Data System). The information on the mainframe computer can be downloaded to microcomputers equipped with a commercially available GIS program called SPANS (Spatial Analysis System) developed by TYDAC Technologies, Inc. It is also possible for users of the Canadian GIS to request a specific analysis from the Canada Land Data System which can then be displayed on an IBM-PC/AT compatible microcomputer.

Observation

GIS programs are complex and interpretations of results can be very difficult for even an experienced computer programmer. The C-Map software package has been examined by the Project Team for possible use in a policy exercise setting. The project team found that even this "user friendly" program requires substantial knowledge of GIS terminology, extensive familiarity with DOS (microcomputer Disc Operating System) commands, and familiarity with D-Base III (a commercially available database program) is also very helpful.

While interactive analysis and display capability of GIS programs would significantly enhance a policy exercise experience, GIS applications remain too difficult at present for the non-expert to use at present. However, technological developments in this field are occurring rapidly, and are being driven by requests for similar types of applications. Geographic information can still be used in a non-interactive format as maps and displays associated with the scenarios (as in the pilot policy exercise). Given adequate lead time, the GIS centers in the U.S. and Canada as described above would be able to perform GIS analyses and provide the results in IBM-PC compatible display, or in hard-copy inkjet printer maps (assuming that the underlying geographic data are available).

Need for and Desirability of a Computer Conference

About half of the respondents would be willing to participate in a computer conference. Most of these would, however, prefer to take part in a face-to-face workshop first, so that they had a sense of who they were corresponding with. Computer conferences were seen to be useful for extended discussion of issues at a depth which is not usually possible in a one to two day conference. For example, an on-line Delphi survey could be sent to scientists to answer specific questions about models or ecosystem dynamics. Many respondents expressed the concern that computer illiteracy and lack of access to computer equipment would be substantial impediments to involvement of many groups.

Observation

Most policy and science group respondents felt that holding a policy exercise via computer conference would be premature at this point, although it is an option that should be held open for the future. Most of the scientific and technical group respondents do have access to microcomputers and staff support, however. This would facilitate use of a conference system by the science group if it were required to develop initial scenarios and to generate subsequent scenarios.

Feasibility of a Great Lakes Policy Exercise

Based on the above findings and observations, the project team concludes that it would be feasible and desirable to hold a Great Lakes Policy Exercise. Lake St. Clair would be a productive focus for a demonstration project, and the issue of lake level fluctuations seems to be of sufficient concern to merit further exploration. Goals and procedural concerns are discussed in the following sections.

1. Goal and Objectives

The goal of the policy exercise would be to provide further development and demonstration of a method by which Lake Committees may effectively address several of the charges given by the Committee of the Whole to the Council of Lake Committees on fish community management [Committee of the Whole, 1980]. Specific objectives include:

- **to identify environmental and other issues which may impede the achievement of fish management objectives**

  The policy exercise allows scientists and managers to consider the impact of factors which are normally outside of their domain. In a lake level policy exercise, for

example, scenarios could developed that require fishery managers to develop policy that establishes ideal lake levels for sustaining fish management objectives. Fishery scientists would be involved in estimating the impact of lake level policies on fish communities. In a policy exercise, the "policy moves" of the participants are exploratory and are not intended to be binding in any way. Participation in a policy exercise would encourage managers to explore issues before they become critical (for example, before there is pressure to provide input to IJC Committees on lake level regulations).

- **to consider information needs and how the issues may be resolved by involving managers and scientists in discussing and "playing through" the policy exercise;**

  In making "policy moves" in the policy exercise, scientists and managers frequently encounter areas in which information is lacking. In the scenario given above, for example, managers may find that an inventory of the aquatic habitat around the lake is lacking. Bathymetry data may be limited for critical areas, or may only be available in 5 foot depth increments which are not useful in determining impacts of lake level changes on fish production. Scientists may find that habitat suitability models are inadequate to ascertain the impact of fluctuations in near shore thermoclines, turbidity, and submerged aquatic vegetation, among other effects. By attempting to play through possible policy option and impacts, scientists and managers can focus research attention on critical areas.

- **to provide a mechanism for discussion between managers and scientists on appropriate actions for resolving the issues;**

  Managers are frequently frustrated at the lack of specific, usable research needed to address critical policy decisions. Scientists are concerned that managers lose a long term perspective by focussing so much on day-to-day issues and "putting out fires." The shift in focus provided by the policy exercise allows managers to explore long-term impacts of critical policy decisions they will most likely face in the future (such as providing input to the IJC on lake level regimes) hand in hand with the scientists who will then have a better idea of which research areas need to be explored now in order to have the critical information when it is required. Scientists gain a better understanding of the realities of policy making that inevitably occurs under conditions

of uncertainty and risk, since all models and projections are based on predictions of the future and are by definition uncertain.

- **to establish a communication network which will assist fishery managers in reaching consensus on issues which involve the interests of more than one jurisdiction and in multiple-use conflicts.**

  A key advantage of the policy exercise is that it provides an opportunity for fishery managers to meet with other "stakeholders" to discuss potential areas in advance of openly stated conflict. Scenarios allow participants to test the waters, and to discuss needs and values in a setting that may allow for some changes to occur that can lead to consensus when and if the issues are actually addressed. In dealing with lake level regulation, for example, fishery managers would need to address the concerns of homeowners (who would like a relatively low, stable lake level to protect property, but not so low as to preclude access); and shipping and utility concerns (who would like a relatively high lake level to maximize tonnage and electric power generation). In a low lake scenario, managers would need to address the issue of dredging and dredge spoil disposal.

2. Process Considerations

There are several process considerations which would make for a more successful policy exercise. These include:

- **Format**

  The workshop format preferred by most interview respondents is to have a one to two day event. A policy exercise fit within these guidelines would necessarily take place in several stages (see Figure 1). The background information would be provided by the convenors and presented in a preliminary Phase 1 workshop with the science group. Following this (with adequate lead time allowed for development and distribution of materials) both the science and policy groups would be convened in a joint session to "play through" the scenarios (Phases 2 and 3). A typical joint session (Phase 2 and 3) workshop would convene in the evening to allow participants to get acquainted, review materials, and discuss policy options informally. A morning session the following day would include small group discussion sessions between policy makers, with participation by scientists and technical experts as required. By the end of the

GREAT LAKES FISHERY COMMISSION
Research Completion Report *

GREAT LAKES POLICY EXERCISE
Lake St. Clair Feasibility Study
Project Completion Report

by

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October, 1989

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Pat Brunett, Southeast Michigan Council of Governments
Michael J. Donahue, Great Lakes Commission
Carlos M. Fetterolf, Great Lakes Fishery Commission
John Gannon, U.S. Fish and Wildlife Service
Robert C. Haas, Michigan Dept. of Natural Resources
Douglas Haffner, Great Lakes Institute, University of Windsor
Elizabeth Harris, East Michigan Environmental Action Council
Douglas B. Jester, Michigan Dept. of Natural Resources
Don MacLennon, Ontario Ministry of Natural Resources
Harold Manson, Ontario Ministry of Natural Resources
Stephen Stewart, Cooperative Extension Service, District Sea Grant Agent

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Finally, acknowledgement is due to the Great Lakes Fishery Commission for their part in funding this study, and to the staff of the Commission for their assistance and advice throughout.

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second day, final policy decisions would be submitted. Review by the science group would then take place either in a subsequent day of the workshop, or possibly thru use of Delphi survey and computer conference facilities. Finally, a post workshop debriefing would be held to present and discuss second generation scenario(s) and implications for the policy and science groups. At the end of the debriefing, a decision would be made as to whether or not a third generation scenario would be useful. Alternatively, policy makers could be presented with a different first generation scenario (for example, a high lake level scenario could follow a low lake level scenario).

- **Duration**

  Based on experiences with the European Forestry policy exercise, sessions that are 3 to 4 hours in length seem to be most productive, allowing ample time for each round of discussion and decision making. This means that a minimum of 6 to 8 hours would be required to "play through" a policy exercise scenario (3 to 4 hours for both the policy group and the science group in meetings that occur sequentially).

- **Location**

  Interview respondents preferred to have a neutral location close at hand to the region under discussion. University settings would be ideal for this (for example, a Lake St. Clair Policy Exercise could be held at the University of Windsor).

- **Background Materials**

  Preparation and distribution of background materials to participants well in advance (2 to 3 weeks prior) of the workshop is essential to the success of a policy exercise, particularly if it is being held in a 6 to 8 hour format. This is especially true if scenarios are complicated and involve use of detailed maps (such as from a GIS analysis), models, or data tables.

VI. Conclusions and Recommendations

Conclusion

The project team finds that development and implementation of a policy exercise such as the one described in the Lake St. Clair Feasibility Study would be both feasible and desirable. Current methods for addressing strategic planning needs in natural resource management are

inadequate to address long-term, large scale issues. New forums that allow participation of multiple stakeholders in a context that allows for consensus building and conflict resolution are needed, as was indicated in the IJC Lake Level Reference Study [IJC, 1989]. The policy exercise has the potential to become such a tool. Conditions for successful use of a policy exercise approach are shown in Figure 3 below.

FIGURE 3
Conditions for Use of a Policy Exercise

A policy exercise is useful for:

- Identification of issues that may impede attainment of long-term objectives (Eg. fish community objectives, lake management objectives)
- Assessment of information needs for strategic planning
- Identification of critical gaps in the current knowledge base that affect strategic planning capability
- Improvement of communication between scientists and managers on issues of mutual concern
- Assessment of potential conflict and opportunities for joint problem solving and consensus building in multiple resource use jurisdictions (Eg. sport vs. commercial fishing)
- Provision of a forum for public education and involvement before issues become critical and positions become firmly entrenched

A policy exercise is NOT useful for:

- Short term tactical planning (Eg. establishing Total Allowable Catch limits)
- Building and testing complex models (Eg. developing expert systems for management of sea lamprey)
- Conflict management (mediation, negotiation) for ongoing disputes

Recommendations

- **The Great Lakes Fishery Commission (GLFC) should undertake a policy exercise on an issue of current strategic concern.** Examples of issues that could be addressed include assessment of impacts on fish community management of events such as (1) a ban on chemical control of sea lamprey; (2) introduction of exotic species such as the zebra mussel or freshwater shark; (3) global warming as it would affect lake levels and water temperature.

- **For issues of interest to the broader Great Lakes Basin community (such as lake level fluctuations), the GLFC should provide a lead role in convening a policy exercise.** This could be done in collaboration with other institutions such as the International Joint Commission, the Council of Great Lakes Governors and Premiers, and the Great Lakes Commission.

- **The GLFC should keep a watching brief on the development of new electronic communication technology and its potential use in long term strategic planning efforts in the Great Lakes Region.** Areas currently under development include the use of electronic mail and computer conference networks, facsimile machines, video conferences, and microcomputer based geographic information systems (GIS). Developments in these areas are occurring rapidly, and are being driven by the needs of the user communities. If used wisely, they will enable the Commission to more effectively address basin-wide planning issues.

VII. Bibliography

Brewer, G. D. "Methods for Synthesis: Policy Exercise." In Sustainable Development of the Biosphere, ed. W.C. Clark and R.E. Munn. New York: Cambridge University Press, 1986.

Christie, W. J., M. Becker, J. W. Cowden, and J. R. Vallentyne. "Managing the Great Lakes Basin as a Home," Journal of Great Lakes Research (1986) 12 (1):2-17.

Caldwell, L. K. (ed.). Perspectives on Ecosystem Management for the Great Lakes. Albany, N.Y.: State University of New York Press, 1988.

Committee of the Whole, A Joint Strategic Plan for Management of Great Lakes Fisheries. Ann Arbor, Michigan: Great Lakes Fishery Commission, 1980.

Edsall, T. A., B. A. Manny, and C. N. Raphael. The St. Clair River and Lake St. Clair, Michigan: An Ecological Profile. U.S. Fish and Wildlife Service Biology Report, 85 (7.3), 1988.

Habitat Planning and Management Task Force and Habitat Advisory Board, Great Lakes Fishery Commission. Guidelines for Fish Habitat Management and Planning in the Great Lakes. Ann Arbor, Michigan: Great Lakes Fishery Commission Special Publication 87-1, 1987.

Hudson, P., B. Kavetsky, P. Kangas, and S. Williamson. Cumulative Impacts in the St. Clair-Detroit River System - A Study in Ecosystem Management. Ann Arbor, Michigan: National Fisheries Research Center - Great Lakes (in publication).

International Joint Commission Water Levels Reference Study Project Management Team. Living With the Lakes: Challenges and Opportunities. Washington, D.C.: International Joint Commission, 1989.

Koonce, J. F. and A. B. Locci-Hernandez. A Decision Support System for the Integrated Management of Sea Lamprey. Ann Arbor, Michigan: Great Lakes Fishery Commission Special Publication 89-1, 1989.

Minns, C.K., J.M. Cooley, and J. E. Forney. Analysis of the Response to the Use of "Adaptive Environmental Assessment Methodology" by the Great Lakes Fishery Commission. Ann Arbor, Michigan: Great Lakes Fishery Commission Special Publication 84-3, 1984.

Toth, F. Practicing the Future: Implementing the Policy Exercise. Working Paper, WP-86-23. Laxenburg, Austria: International Institute for Applied Systems Analysis, 1986.

Underwood, S. E. and F. Toth. "The Teleconferencing Exercise: Supporting Exploration and Synthesis for Environmental Management." International Institute for Applied Systems Analysis. Laxenburg, Austria: 1987. Photocopied.

APPENDIX A

Questionnaire for Preliminary Interviews

Great Lakes Policy Exercise

1. Briefly review the context of the Policy Exercise:

   - changing lake levels; current variations and predictions of future changes based on global warming models

   - initial focus of study on Lake St. Clair

   - interest in long-term (30-40 years) impacts on ecosystem

   - involves many "stakeholders" in policy decisions

2. Ask permission to tape the interview for purposes of clarity, accuracy. Interviews are not confidential, as we are hoping to share the information we obtain with others interested in the lake level issue.

3. Name, Official Title, Address, Telephone Number of participant

4. Brief description of present position of participant (responsibilities, types of issues dealt with)

5. From your point of view, who are the key decision makers regarding the Lake St. Clair ecosystem.

6. What specific issues or concerns would you or the organization you represent have regarding changes in lake levels?

7. We are exploring the possibility of putting together a Lake St. Clair Policy Exercise. If we do, would you be interested in participating?

   If NO - can you suggest others in positions similar to yours who might be interested?

   If YES -

   Can you suggest others in postitions similar to yours who might also be interested?

   If the Policy Exercise were to be run as a workshop, do you have any suggestions on how to make it worthwhile?

   Would there be any constraints on your participation?

   - Duration (one day, two day maximum?)

   - Location

   - Travel time/expense

   - Other

If it were to be run on a computer network (as a computer conference), would you be willing to participate or at least attempt to participate?

If NO: why not

If YES:

Do you have any experience with microcomputers? (how much, what type of equipment)

Do you have any familiarity with the following types of software:

- word processing (what packages)

- spreadsheet (what packages)

- graphics (what packages)

- electronic mail/computer conference (what system, what type of modem is used)

8. Do you have any other suggestions about how we could make a policy exercise successful?

APPENDIX B

List of Interviewees and Potential Candidates for Participation in a Policy Exercise

Science and Technology Group

Interviews Completed:

Bill Enslin, Michigan State University

Randy Eshenroder, Great Lakes Fishery Commission

Douglas Haffner, Great Lakes Institute, University of Windsor

Holly Hartman, Great Lakes Environmental Research Lab

Patrick Hudson, U.S. Fish and Wildlife Service

Douglas Jester, Michigan Department of Natural Resources

Robert Kavetsky, U.S. Fish and Wildlife Service

Robert Pacific, U.S. Fish and Wildlife Service

Frank Quinn, Great Lakes Environmental Research Lab

Michael Scieszka, Michigan Department of Natural Resources

Don Williams, U.S. Army Corps of Engineers

Other Potential Candidates:

Tom Fontaine, Great Lakes Environmental Research Lab

Paul Freedman, Limno-Tech Inc., Ann Arbor

Gene Jaworski, Eastern Michigan University

Carol Jones, University of Michigan

David Jude, University of Michigan

Bruce Manny, U.S. Fish and Wildlife Service

Michael O'Brien, U.S. Army Corps of Engineers

Daniel Talhelm, Michigan State University

Policy Group

Interviews Completed:

David Borgeson, Michigan Department of Natural Resources

James Bresciami, Huron-Clinton Metropolitan Authority, Metro Beach Metropark

Bill Bryant, Michigan Department of Natural Resources

Don Carlberg, U.S. Coast Guard

Michael Donahue, Great Lakes Commission

Carlos Fetterolf, Great Lakes Fishery Commission

John Gannon, U.S. Fish and Wildlife Service

Robert Haas, Michigan Department of Natural Resources

Elizabeth Harris, East Michigan Environmental Action Council

Dean Jacobs, Walpole Band

Ralph Kant, Lake St. Clair Advisory Committee

Brian McKeon, Morterm Limited

Don MacLennon, Ontario Ministry of Natural Resources

Ron Mermuys, Great Lakes Coalition

Russell Piper, Ontario Federation of Hunters and Anglers

Ron Spitler, Michigan Department of Natural Resources

Stephen Stewart, Sea Grant Extension Agent

Asa Wright, Michigan Department of Natural Resources

Other Potential Candidates:

John Armstrong, Traverse Group, Ann Arbor

Chris Balboni, U.S. Coast Guard

Garth Bangay, Wetlands Advisor, Indian Northern Affairs, Canada

Pat Brunett, Southeast Michigan Council of Governments

David Cree, Manager, Port of Windsor

David Hales, Michigan Department of Natural Resources

Dennis Hall, Michigan Department of Natural Resources

Art Heidrich, Detroit Edison

Peggy Johnson, Clinton River Watershed

Nicholas Kachman, General Motors Corporation, Environmental Activity Staff

Ernie Kalcus, Michigan Department of Natural Resources

John Keen, Keen's Marina, Detroit

Jim Kellow, Wayne County Port Authority

John Klass, Michigan Charter Boat Association

Tom Oprey, Detroit Free Press

John Perry, Macomb County Emergency Services

Del Rector, Michigan Department of Natural Resources

John Robertson, Michigan Department of Natural Resources

George Ryan, Lakes Carrier Association

Butch Sap, Macomb Daily

Chris Shafer, Michigan Department of Natural Resources

Barbara Stanton, Detroit Free Press

Ray Underwood, Michigan Boating Industry Association

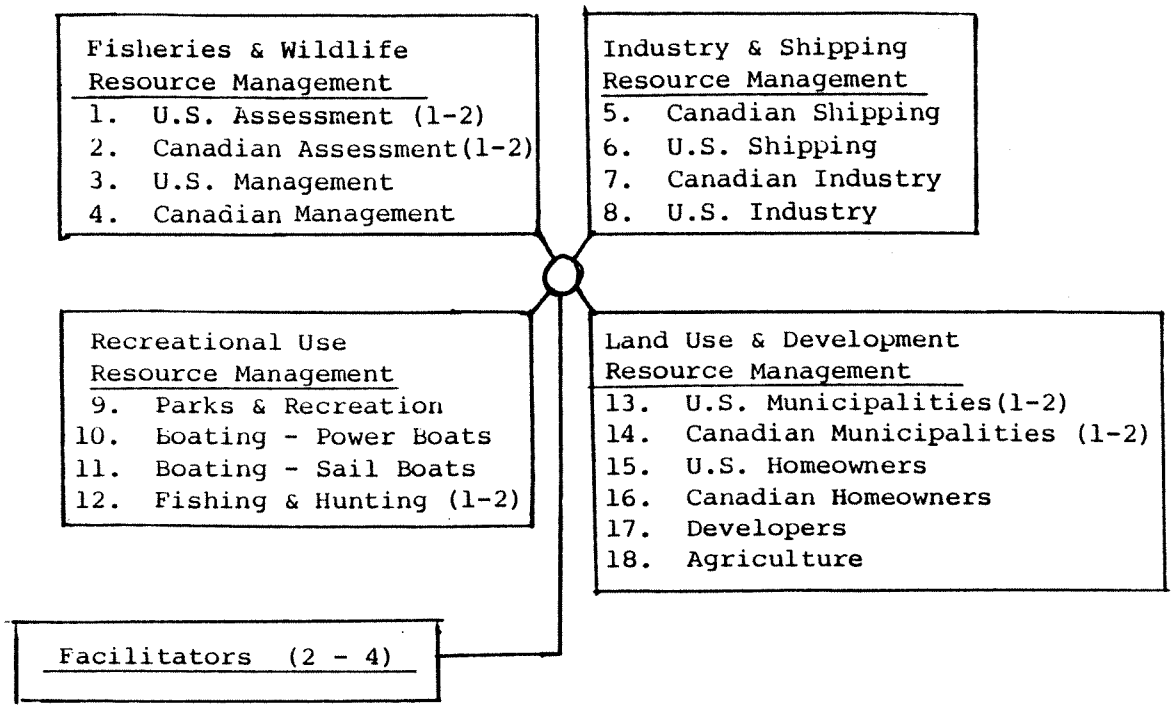
Bruno Van den Berghe, Windsor Sportsmen's Club

Ron Wilshaw, U.S. Army Corps of Engineers

APPENDIX C - 1: CHARGE TO PARTICIPANTS

Lake St. Clair: Exploring an Integrated Approach to Lake Level Management

Role Diagram



Definitional Note: Integration in this Practicum refers to (1) interdisciplinary integration between Resource Management Groups; (2) integration of multiple functions within Resource Management Groups (e.g. policy development, management, assessment, advocacy); (3) integrated impact assessment for high and low lake level scenarios and four geographical zones; (4) conflict management as an integrative decision aid.

Preliminary Problem Definition

Changing lake levels are a fact of life that influence many decisions which have been and will be made in the future. The Great Lakes Fishery Commission and the International Joint Commission have each recently initiated projects which call for development of integrated ecosystem-based approaches to lake level management.

The Great Lakes Fishery Commission is currently sponsoring a feasibility study of an approach called the "Great Lakes Policy Exercise." The Policy Exercise approach was initially developed for use by the International Institute for Applied Systems Analysis to study integrated policy approaches to global ecosystem issues such as the impact of acid rain on forestry management. The Policy Exercise is a systematic process that presents and clarifies alternative futures, possible policy actions, and the ramifications of those policies, using existing quantitative and qualitative data. The purpose is to analyze resource policy options, and to present the results in a policy briefing document (note: students involved in this practicum are not expected to produce a briefing document).

The International Joint Commission is presently responding to a "Great Lakes Levels Reference" from the U.S. and Canadian Governments. They are to examine and report on methods for alleviating the adverse consequences of fluctuating lake levels in the Great Lakes. The study is organized in four disciplinary-based functional groups plus one integration group. For example, Functional Group 2 of the Great Lakes Levels Reference study is currently involved in developing an integrated approach to assess the impacts of fluctuating water levels on coastal zone ecology. This group has included an "integration group" within their organizational scheme, in addition to three "disciplinary" (aquatic, terrestrial, and wetlands) groups. They intend to develop a "spatial evaluation framework," as a means of organizing and analyzing the coastal zone data base and developing a predictive model of the potential impacts of fluctuating lake levels on coastal zone resources.

Both of these projects indicate a serious commitment by two major international commissions to the development of methods for integrating scientific information from several disciplines and providing the information in a format useful for policy decisions.

General Charge

You have been invited to participate in a preliminary version of a workshop on "Exploring Integrated Approaches to Lake Level Management of Lake St. Clair." This workshop is intended to result in a scoping and bounding of resource management policy issues resulting from fluctuating lake levels given two scenarios (high and low lake levels). You will work with the other members of your group in (1) identifying and rating the impact of fluctuating lake levels for various geographic zones of the lake; (2) identifying policy options for highly impacted zones; (3) attempting to reach consensus with other groups on the nature, extent, and options for responding to high and low lake levels.

Specific Charge

1. Four resource management groups will participate (Fisheries and Wildlife, Industry and Shipping, Recreational Use, and Land Use and Development). The interests of these groups frequently conflict with respect to use and management of the resource base, and particularly with respect to lake levels management. Each team will examine the impact of two lake level scenarios (high and low lake levels) for each of four geographical zones (A-Anchor Bay, B-Detroit/Windsor, C-Thames River, D-St. Clair Flats). These zones are shown on the attached map.

2. The resource management groups will identify potential ecosystem level impacts on the resource base under high and low lake levels for the four geographic zones. These zones will then be rated as high, medium, or low impact zones using criteria developed by the groups. If time permits, the groups will begin to outline potential policy approaches to problems identified in the high impact zones.

3. During the first hour of the lab, the facilitators will assist the groups in the process of identification and assessment of impacts within the groups. During the second and third hours, the facilitators will assist the groups in an exchange of information, and will attempt to reach a consensus on (1) the nature and degree of potential impacts, and (2) policy approaches to problems identified in highly impacted zones. The fourth hour of the lab will be a preliminary evaluation and debriefing of the practicum.

4. Microcomputer workstations will be used to facilitate the recording and sharing of information between the groups. Some familiarity with IBM-compatible microcomputers, UB Message System, Confer, and Lotus 1-2-3 Spreadsheets is desirable, but is not required for participation. The workshop will be held in the Computing Center in the Dana Building (110 Dana).

5. Information will be shared between the groups in two ways: (1) in a remote mode, using the UB message system and Confer to share and discuss information; (2) in a face-to-face facilitated dialog between participants. The remote mode of discussion has been proposed as a supplement to (or possibly an alternative to) face-to-face workshops, partly because of the high cost (time and money) of travel. In the debriefing session, participants will discuss the advantages and disadvantages of these modes of communication, and will evaluate the use of microcomputers in this setting.

6. Practicum IV-C is intended to bring students up to date in terms of new approaches to integrative decision aids currently being considered by the International Joint Commission and the Great Lakes Fishery Commission. It will also result in an evaluation of several group process options (written materials vs. interactive microcomputer models; computer conferences vs. face-to-face discussions). This information will serve as part of the research for a doctoral dissertation by Chris Branson. The Commissions will also benefit as they will be provided with a report on the results of the practicum.

Role Summaries

1. U.S. Assessment, Fisheries & Wildlife: you represent the scientific and long-range strategic policy setting branch of fishery and wildlife management from a state and/or federal perspective (for example, the research branch of the US Fish & Wildlife Service); including impacts of dredge & fill, assessment and preservation of habitat, non-point source pollution control, etc..

2. Canadian Assessment, Fisheries and Wildlife: you represent a similar (to that above) scientific and long-range strategic policy setting branch of fishery and wildlife management from the Canadian perspective (Provincial and/or Federal perspective, for example, a research scientist from the Department of Fisheries & Oceans).

3. U.S. Management: you represent policy making at the public level (e.g. a manager in a Michigan DNR office in Mt. Clemens, issuing fishing and hunting permits, stocking fish, setting quotas, etc.).

4. Canadian Management: you represent policy making at the public level (e.g. a manager in an Ontario Ministry of Natural Resources office, issuing fishing and hunting permits, stocking fish, setting quotas, etc.).

5. Canadian Shipping: your role is to represent Canadian shipping interests (e.g. winter navigation, length of shipping season, depth of shipping channels, etc.).

6. U.S. Shipping: same as above from U.S. perspective.

7. Canadian Industry: you are an environmental manager from a major petrochemical plant along the "Chemical Valley" in Sarnia, Ontario. You are concerned about the capacity of the lake to receive your presently permitted discharge, and whether any more stringent regulations might be set.

8. U.S. Industry: you are an environmental manager from an automotive industry located in Detroit. You are concerned about the quality of the cooling water you presently draw from the lake and about whether lake levels would affect your present permitted level of discharge.

9. Parks and Recreation: you are a supervisor who works for the Metropolitan (U.S.) Parks and Recreation Commission. You are concerned about the impacts of fluctuating lake levels on the nature and quality of recreational use (boating, swimming, diving, marathons, etc.).

10. Power Boating: you represent a group of speed-boating enthusiasts. You are concerned about access to the lake and sufficient space and depth to operate power boats.

11. Sail Boating: you represent a group of sailing enthusiasts. You are concerned about access to the lake, and sufficient controls on shipping and power boats to allow you space for safe sailing.

12. Fishing and Hunting: you represent a group of sports hunters and/or fishermen who want access to the wetlands and spawning grounds around the lake, adequate stocking policies, and high catch limits.

13. U.S. Municipalities: you represent a major U.S. city, and are concerned about zoning, property taxes, flood protection, and infrastructure issues.

14. Canadian Municipalities: same as above, but from a Canadian perspective.

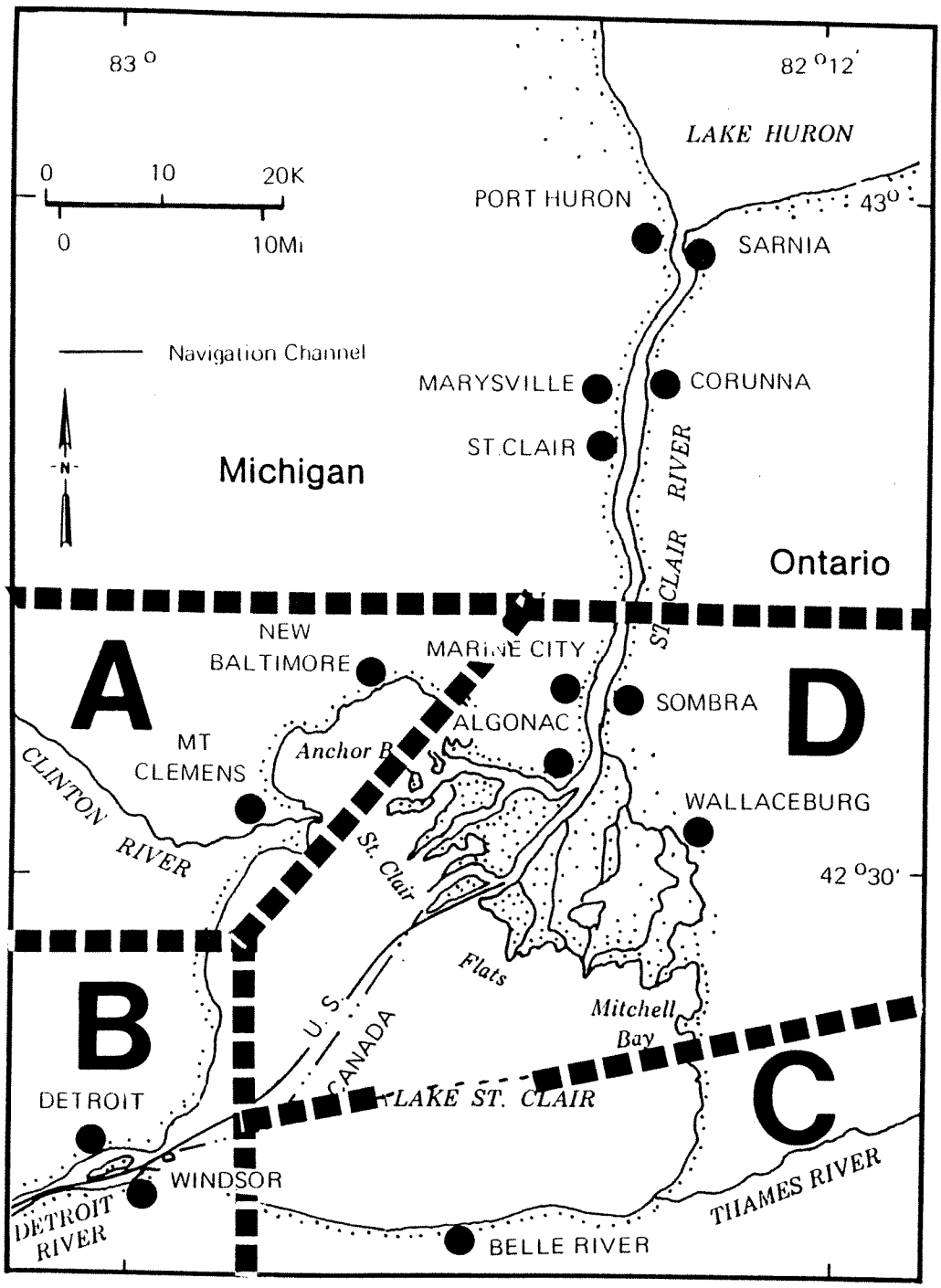
15. U.S. Homeowners: you represent a group of homeowners having property along the lakefront. You are concerned about access to the lake, property taxes, flood insurance, property values, etc.

16. Canadian Homeowners: same as above, but from a Canadian perspective.

17. Developers: you represent a large property development firm, interested in purchasing and upgrading waterfront property on either the U.S. or Canadian side of the lake.

18. Agriculture: you represent a group of influential farmers who are concerned about requirements for farming, such as the ability to drain and fill land, or restrictions on the use of fertilizers and pesticides.

Lake St. Clair - Geographical Zones



Zones:

A- Anchor Bay
B- Detroit/Windsor
C- Thames River
D- St. Clair Flats

APPENDIX C - 2: INSTRUCTIONS TO PARTICIPANTS AND WORKSHEETS

NR502 - Integrative Problem Solving
Practicum IV-C: Lake St. Clair:
Exploring an Integrated Approach to Lake Level Management

INSTRUCTIONS TO PARTICIPANTS

INDIVIDUALLY:

1. Read the Scenarios

2. Fill out the Worksheets

    a. Rate the anticipated severity of impact for each zone for both high and low lake level scenarios

    b. Prioritize the zone/scenarios - identify the top three

    c. Identify policy options for the top three zone/scenarios

AS A FUNCTIONAL GROUP:

3. Identify one person as the group contact for sending and receiving MTS messages. Sign on to MTS using the Windows package. Boot the computer with Windows in Drive A, type "window", hit return, and continue with signon. If you need help with this, just ask. The contact person should send a message to the facilitators by 2:15 p.m. so that other groups will know who to contact.

4. Attempt to reach consensus within your group as to which are the top three zones/scenarios. A Lotus 1-2-3 spreadsheet is available to enter your individual ratings and calculate the group average, if you wish to use it. Room 2520 will be available for small group meetings after 2:00 p.m. As you do this, you may wish to contact other groups via MTS to discuss priorities or get additional information.

5. Prepare a list of policy options for the top three zone/scenarios.

6. Select a reporter who will make a brief presentation of your findings to the whole group at the workshop.

AS A WHOLE GROUP

7. We will convene a workshop upstairs in Room 2520 at approximately 3:15 p.m. The facilitators will guide the groups in reaching consensus on the top three zone/scenarios, and related policy options.

8. We will spend some time debriefing at 4:30, and again on Wednesday in class.

NR 502 - Practicum IV - C

Lake St. Clair: Exploring Integrated Approaches to Lake Level Management

PARTICIPANT WORKSHEET

STEP 1: RATING THE IMPACTS

RATE EACH ZONE/SCENARIO ON A SCALE OF 1 - 5 AS FOLLOWS:

1 2 3 4 5

minimal impact moderate impact high impact

ENTER YOUR RESULTS IN THE TABLE BELOW

	ZONE A	ZONE B	ZONE C	ZONE D
SCENARIO 1 LOW LAKE				
SCENARIO 2 HIGH LAKE				

STEP 2: IDENTIFY THE TOP THREE ZONE/SCENARIOS

1. ----------

2. ----------

3. ----------

STEP 3: IDENTIFY POLICY OPTIONS FOR THE TOP THREE ZONE/SCENARIOS

POLICY OPTION 1 FOR ZONE _____ SCENARIO_____

WHO:

DOES WHAT:

WHEN:

WHY (INTENDED IMPACT):

COSTS/BENEFITS (WHO PAYS, WHO BENEFITS)

POLICY OPTION 2 FOR ZONE _____ SCENARIO_____

WHO:

DOES WHAT:

WHEN:

WHY (INTENDED IMPACT):

COSTS/BENEFITS (WHO PAYS, WHO BENEFITS)

POLICY OPTION 3 FOR ZONE _____ SCENARIO_____

WHO:

DOES WHAT:

WHEN:

WHY (INTENDED IMPACT):

COSTS/BENEFITS (WHO PAYS, WHO BENEFITS)