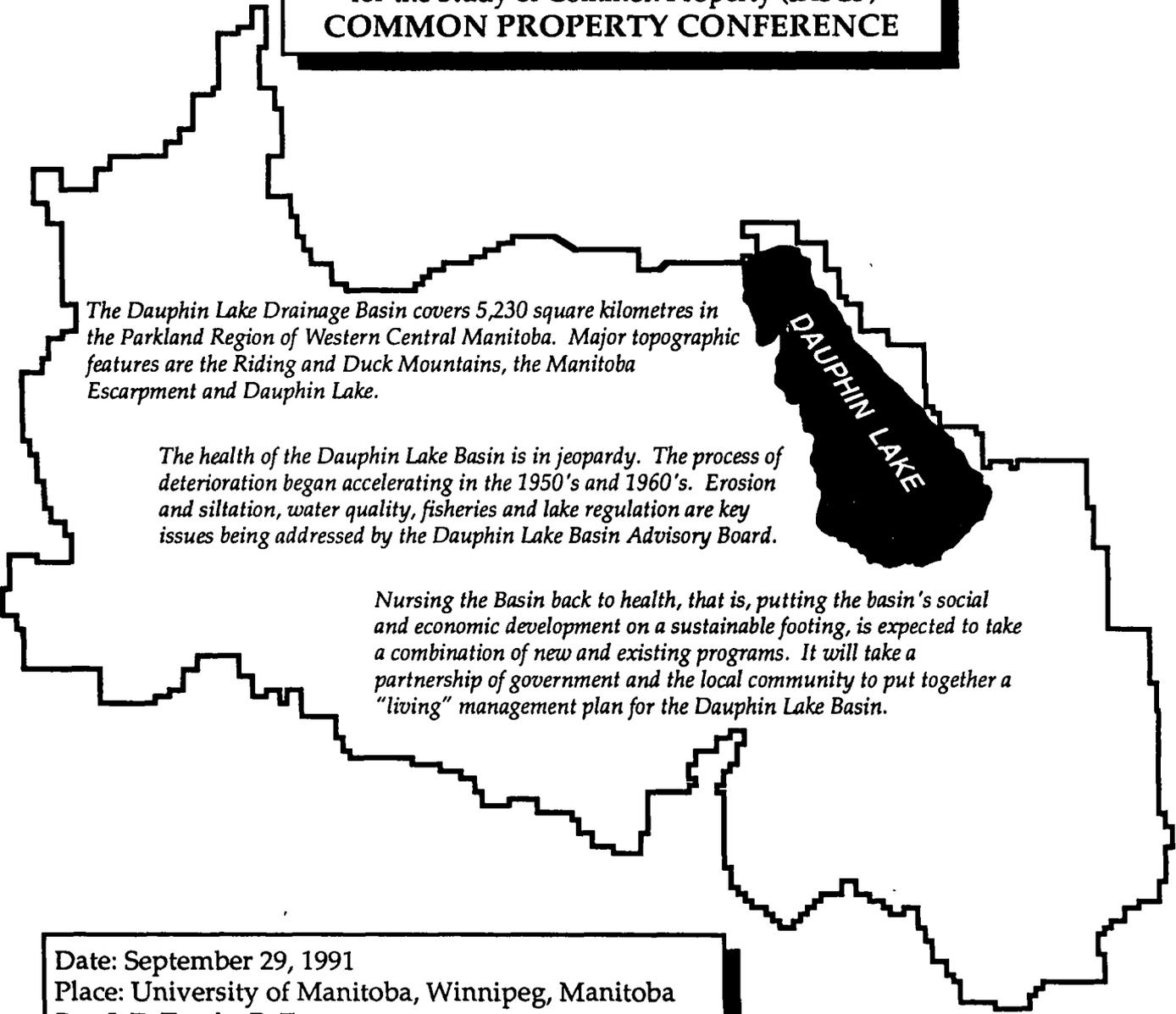


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DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER

Presentation to

International Association
for the Study of Common Property (IASCP)
COMMON PROPERTY CONFERENCE



The Dauphin Lake Drainage Basin covers 5,230 square kilometres in the Parkland Region of Western Central Manitoba. Major topographic features are the Riding and Duck Mountains, the Manitoba Escarpment and Dauphin Lake.

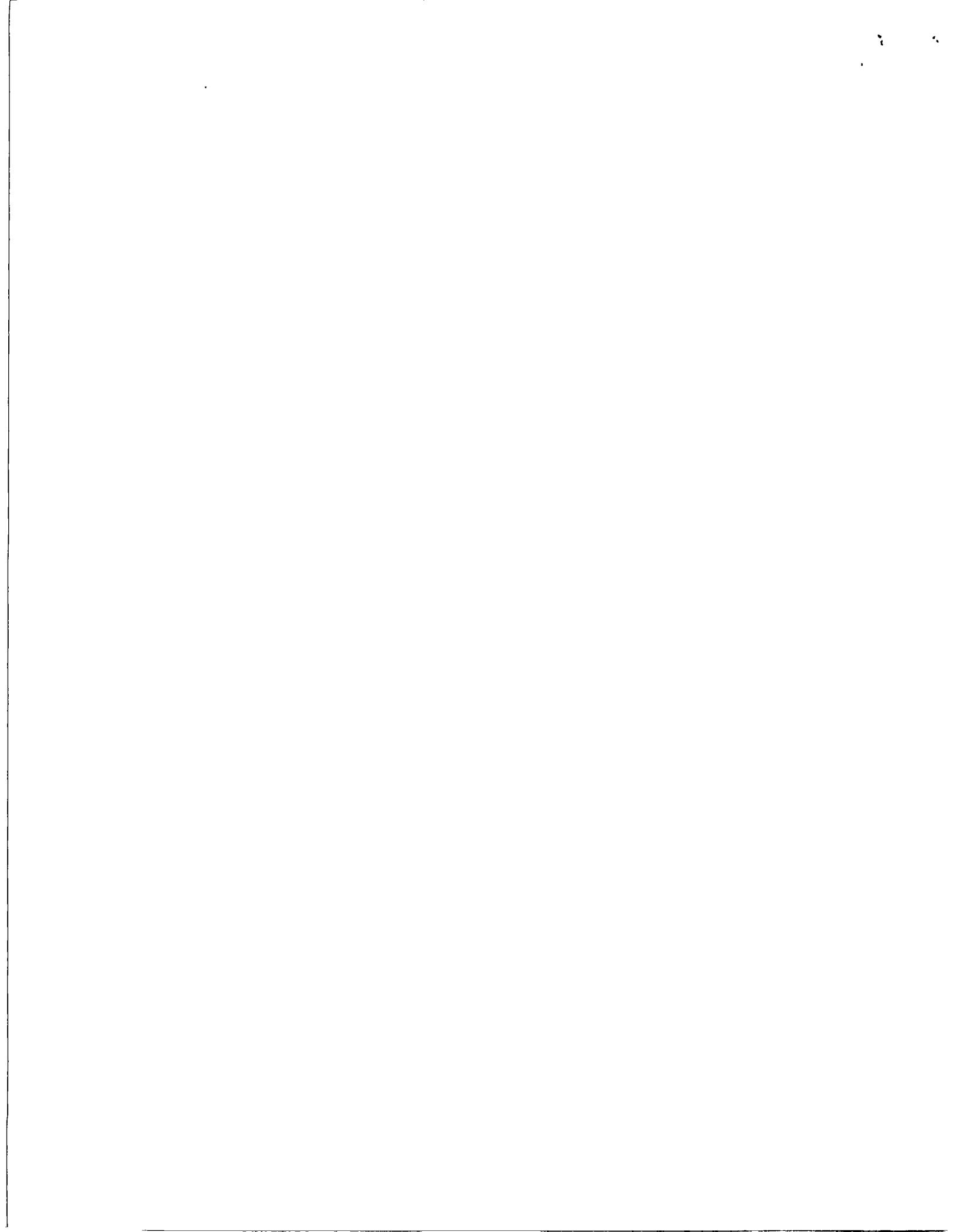
The health of the Dauphin Lake Basin is in jeopardy. The process of deterioration began accelerating in the 1950's and 1960's. Erosion and siltation, water quality, fisheries and lake regulation are key issues being addressed by the Dauphin Lake Basin Advisory Board.

Nursing the Basin back to health, that is, putting the basin's social and economic development on a sustainable footing, is expected to take a combination of new and existing programs. It will take a partnership of government and the local community to put together a "living" management plan for the Dauphin Lake Basin.

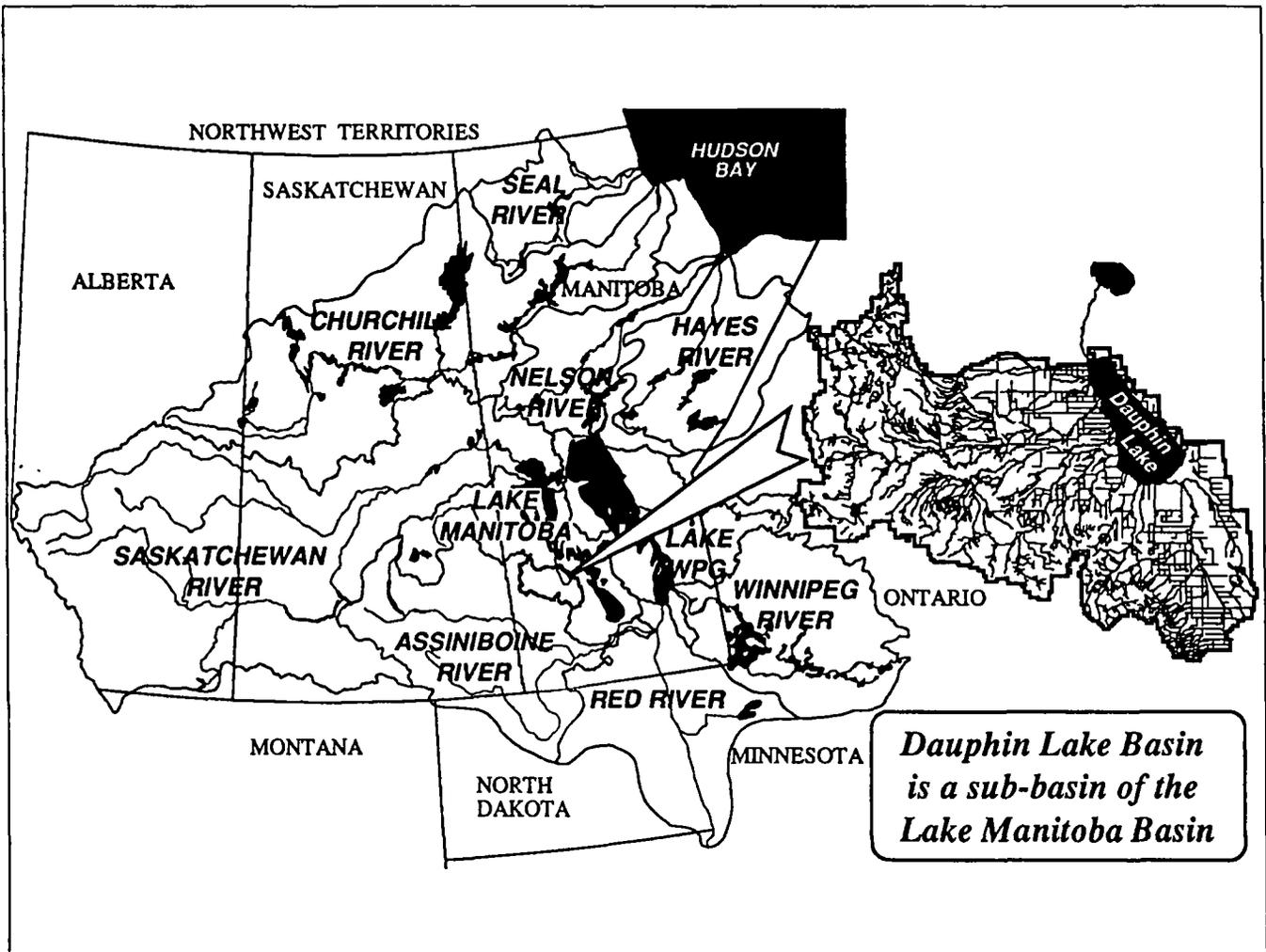
Date: September 29, 1991
Place: University of Manitoba, Winnipeg, Manitoba
By: J. E. Towle, P. Eng.
Provincial Basin Coordinator
Water Resources Branch
Department of Natural Resources
27 - 2nd Avenue, S.W. Dauphin, Manitoba R7N 3E5

Manitoba
Natural Resources
Water Resources



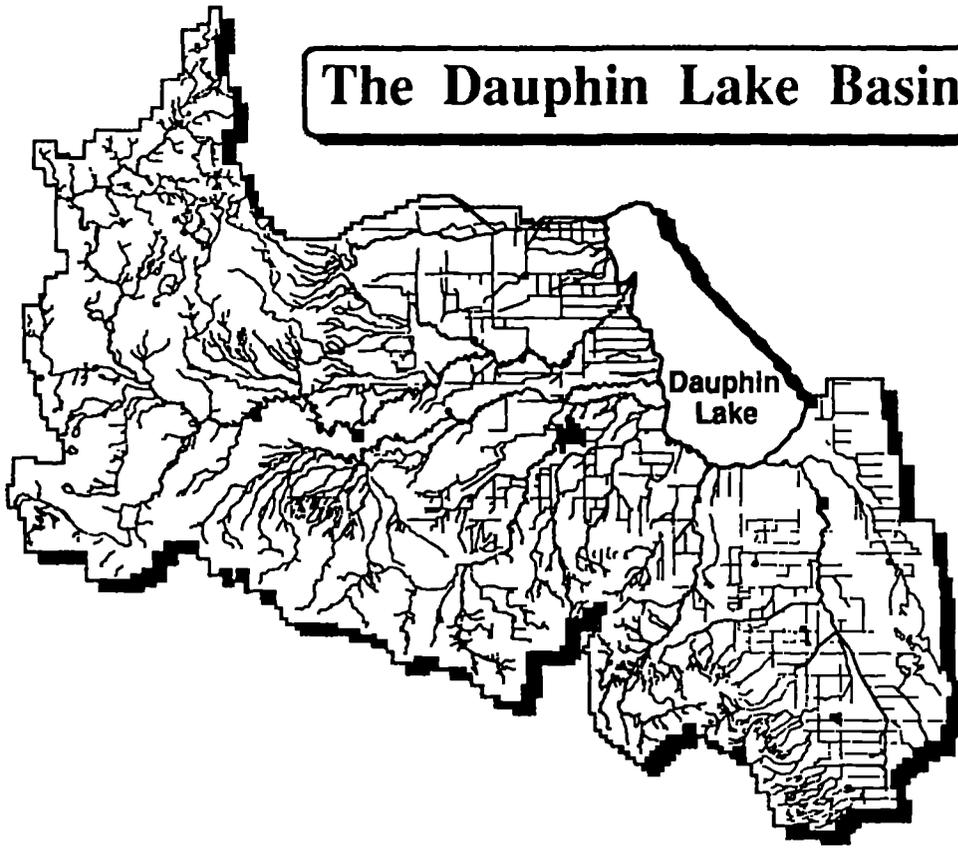


DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER



The Dauphin Lake Basin, which is approximately 5,230 square kilometres in area, is located in western Manitoba within the Lake Manitoba Basin.

The Dauphin Lake Basin



The health of the Dauphin Lake Basin is in jeopardy. The process of deterioration began accelerating in the 1950's and 1960's.

Unchecked runoff has decreased the economic and environmental health of the land and streams. Siltation of Dauphin Lake and its spawning streams threaten an important fishery.

Tourism, fisheries, wildlife and other economic opportunities have suffered declines in the wake of basin deterioration.

Reclaiming a Basin

THE FOLLOWING GOALS ARE SUGGESTED:

- 1. HALT THE DETERIORATION OF DAUPHIN LAKE BY DEALING WITH THE KEY PROBLEMS THROUGHOUT THE BASIN.**

THE MAJOR CAUSES OF DETERIORATION ARE EROSION, SILTATION AND NUTRIENT LOADING.

- 2. ENHANCE DAUPHIN LAKE ONCE PROGRESS, WITH HALTING DETERIORATION, IS UNDERWAY.**

INVESTMENT IN THIS WITHOUT PROGRESS ON No. 1 WILL BE SHORTLIVED AND THEN THERE WILL BE NO FUTURE OPTIONS FOR ENHANCEMENT.

The challenge facing resource managers in reclaiming this basin is to halt ever increasing deterioration of the natural resources and land base that has been taking place throughout the Dauphin Lake Basin due to the interference of human activity.

Once this deterioration of the basin has been stopped, or slowed to a manageable rate, efforts can be focused on enhancing what is left. Development of the basin's resources could then proceed at a pace that satisfies current needs without jeopardizing the prospect of future generations.

In short, further development of the basin would be put on a sustainable footing.

S U S T A I N A B L E D E V E L O P M E N T



Towards A
Sustainable Development
Strategy
For Manitobans

DEVELOPMENT IN HARMONY WITH OUR ENVIRONMENT

Manitoba Round Table
on Environment & Economy



The Province of Manitoba and the residents of the Dauphin Lake Basin have a common vision known as Sustainable Development. Our vision for Manitoba is a sound environment and sustainable economic growth. The Dauphin Lake Basin Enhancement Program is a prime example of the principles of Sustainable Development in action in Manitoba.

Dauphin Lake

Opportunities for Restoration



View of the south end of Edwards Creek in Dauphin Lake

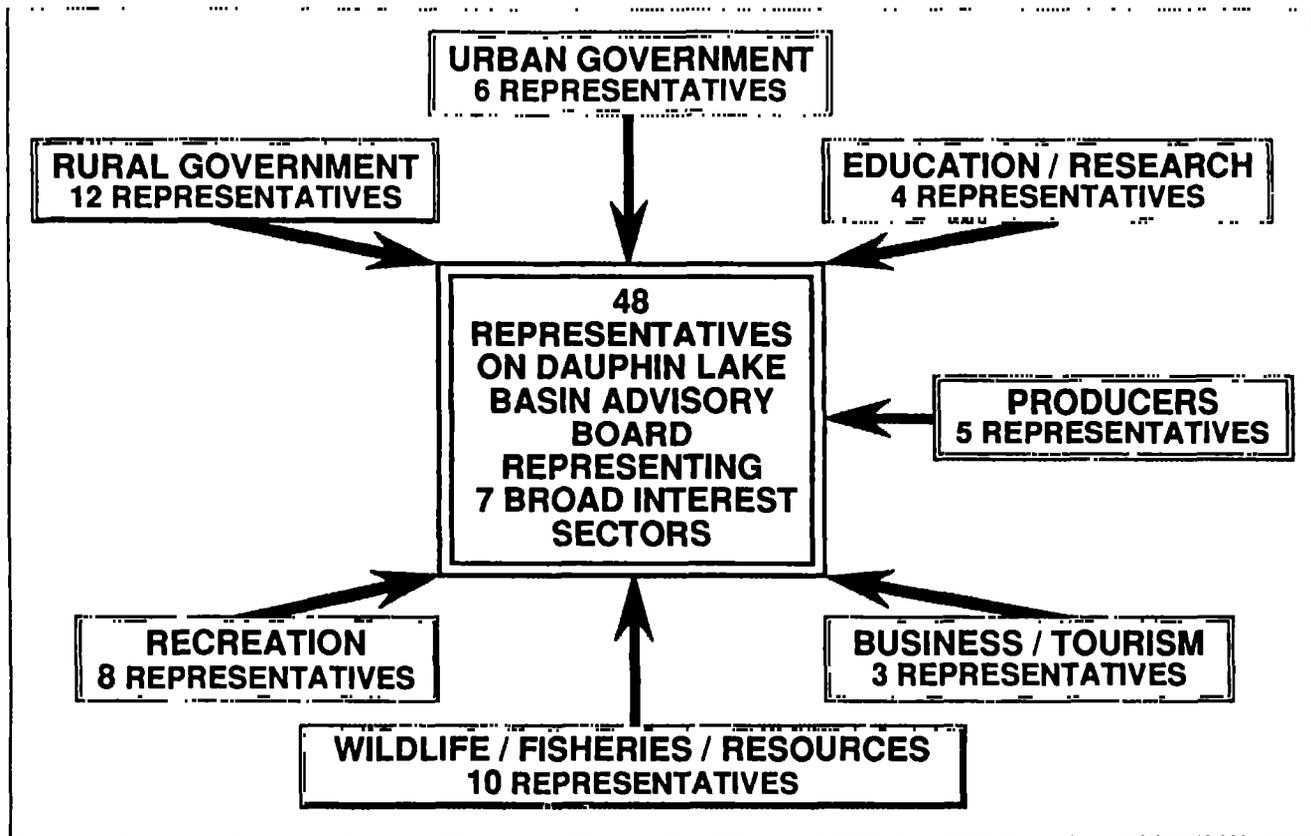
December 1989

Manitoba



More than 30 years of studies and investigations into ways and means of arresting further decline of the Dauphin Lake Basin and nursing it back to health have been summarized recently in a report called "Dauphin Lake - Opportunities for Restoration." This report was produced in 1989 by a multi-agency, Technical Advisory Group led by the Department of Natural Resources - Water Resources Branch.

DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER



On December 5, 1989, the Minister of Natural Resources, Mr. Harry Enns announced the establishment of a Dauphin Lake Basin Advisory Board. This Advisory Board concept had been recommended by the Manitoba Water Commission in 1984 in a comprehensive report titled "Dauphin Lake Regulation and Siltation Study."

The Advisory Board was formed by invitation from the Minister's office. Some 60 organizations and interest groups were invited to send representatives to the first board meeting on January 17, 1990.

At this inaugural board meeting, 48 representatives began working together for the health of the basin.

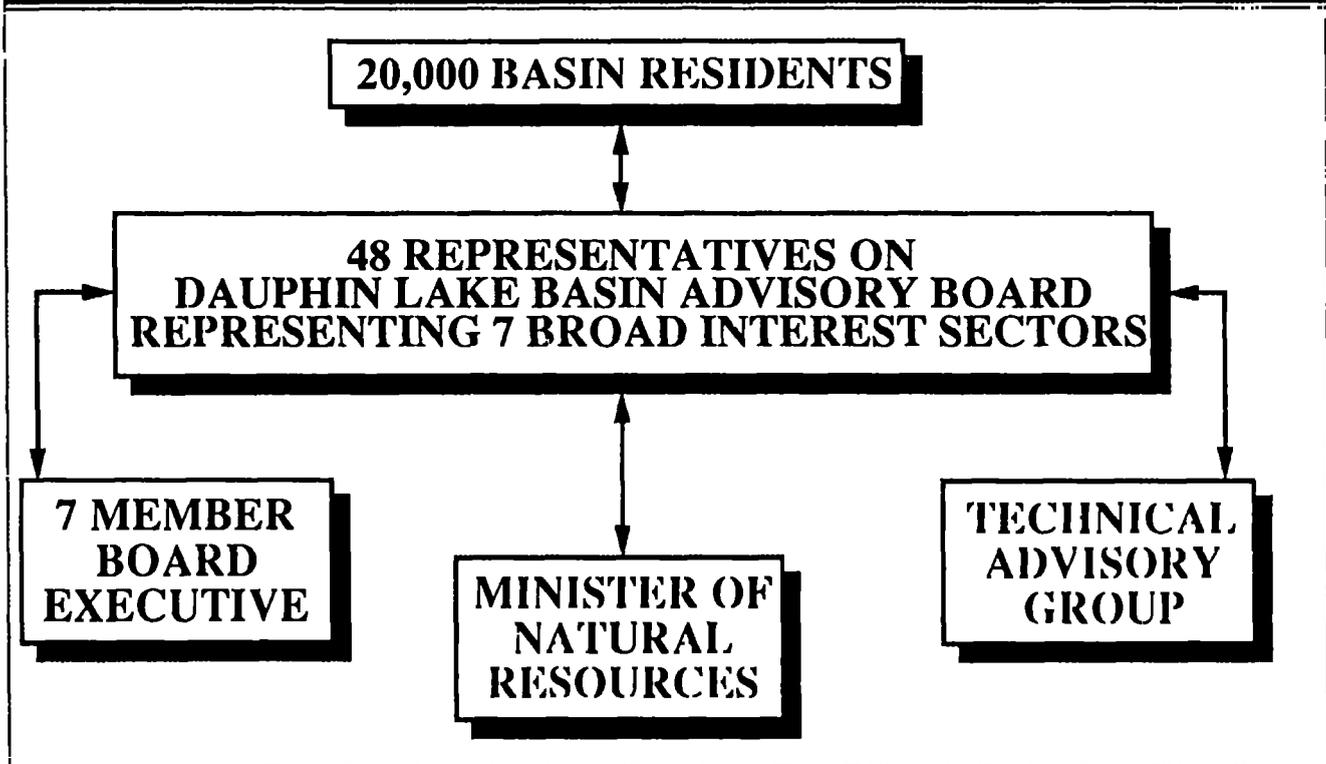
A terms of reference and a method of operation were approved. Also, a constitution and by-laws were drawn up and approved.

Terms of Reference Dauphin Lake Basin Advisory Board

The Dauphin Lake Basin Advisory Board is directed by the Minister of Natural Resources as follows:

1. The Advisory Board shall work together with the various resource owners, users and managers as a team to formulate and coordinate the implementation of a basin management plan that will work toward enhancement of the entire Dauphin Lake basin.
2. The Advisory Board shall provide advice and guidance to the Minister on a variety of pilot and demonstration projects which would be proposed by various organizations.
3. The Advisory Board shall disseminate factual and educational information to local residents on the problems and opportunities in the basin.
4. The Advisory Board shall solicit and synthesize local input on basin issues.

DAUPHIN LAKE BASIN ENHANCEMENT PROGRAM

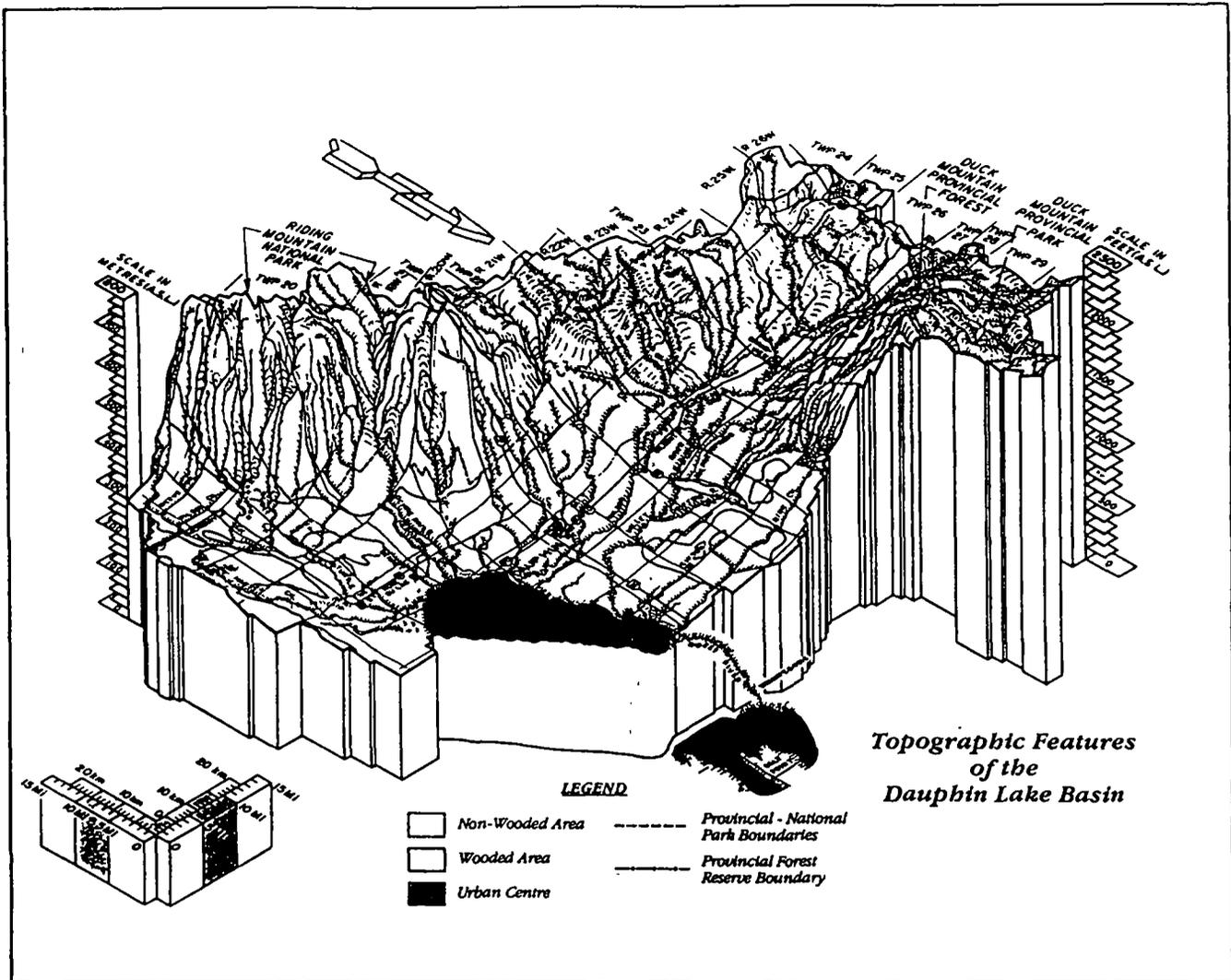


The 48 board members also choose a 5 member nominating committee to put together a list of candidates for an election of a 7 member executive for a one year term at the next board meeting on February 7, 1990.

Once this executive was chosen they elected a chairperson and a vice - chairperson to guide the board in their difficult task of working together to reclaim a basin.

The Board used the report "Dauphin Lake - Opportunities for Restoration" as their manual in the task of agreeing on a course of action to help restore the health of the basin.

DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER

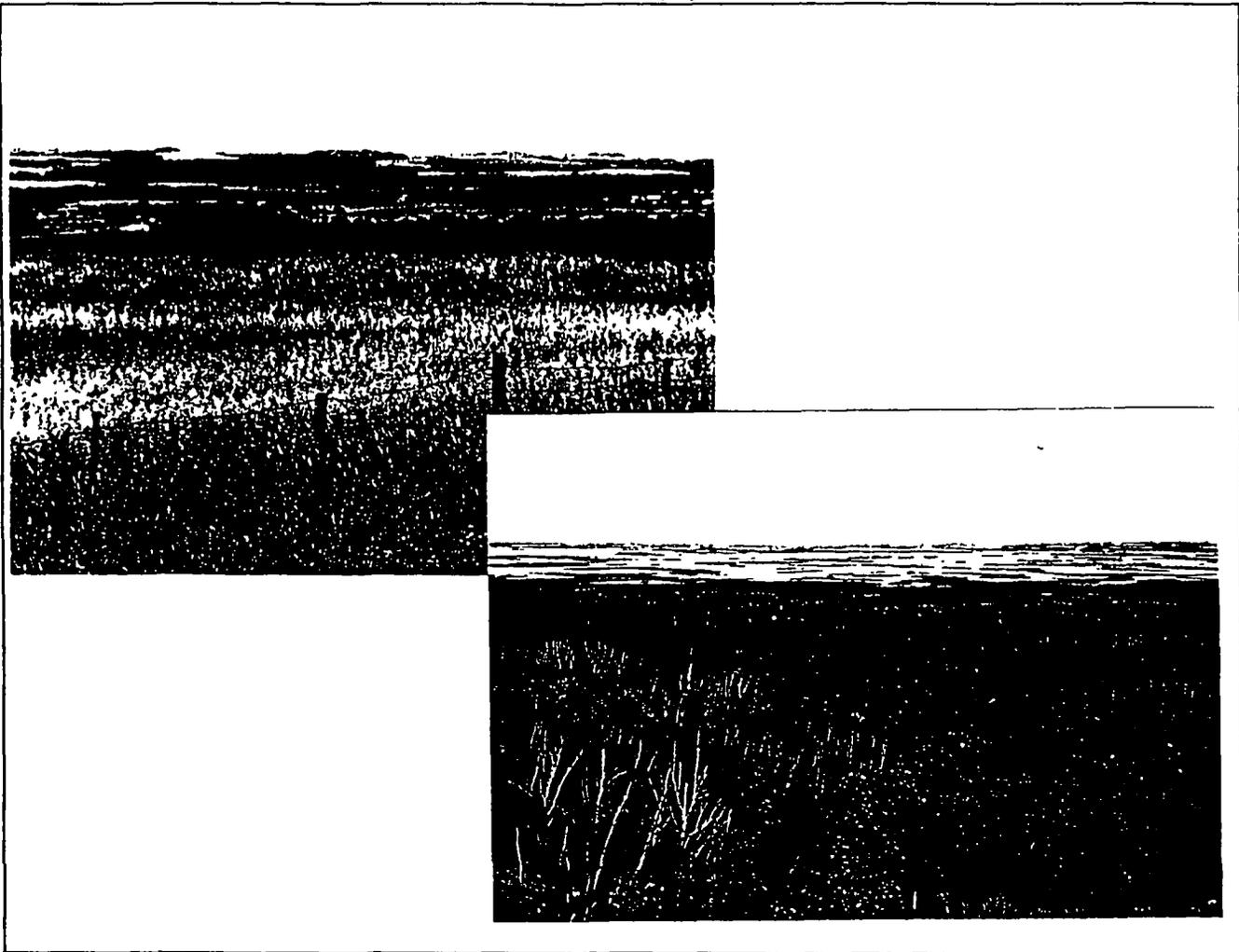


Major topographic features of the Dauphin Lake Basin are the Riding and Duck mountains, the Manitoba Escarpment, and Dauphin Lake.

Total basin relief is 580 metres, 275 metres of which is concentrated at the escarpment with its steep slopes and deeply incised stream channels.

The basin is drained by seven major streams which empty into Dauphin Lake. The Mossy River drains Dauphin Lake into Lake Winnipegosis.

Dauphin Lake covers 322 square kilometres and averages 2.1 metres deep.



Erosion throughout the basin and resulting sedimentation threaten the sustainability of the lake.

Population of the basin is about 20,000, with just over half living in the major urban centres of Dauphin, Ste. Rose Du Lac, Grandview, Gilbert Plains and McCreary.

Basin economy depends primarily on agriculture. Cereal production is the main activity, with some forages and livestock production.

Service industries, secondary manufacturing, and tourism play a lesser but significant role in the basin's economy.

Tourism currently focuses on the potential of Dauphin Lake, nearby Riding Mountain, and Lake Manitoba Narrows.

Key Issues

- ***LAKE REGULATION***
 - *Why raise the water level on Dauphin Lake?*
- ***SILTATION***
 - *Where does the sediment come from?*
- ***WATER QUALITY***
 - *What affects the water quality of Dauphin Lake?*
- ***FISHERIES***
 - *Why has the fishery failed on Dauphin Lake?*

The board wrestled with four key issues. They are Lake Regulation, Siltation, Water Quality and Fisheries.

***Key Issue -
Lake Regulation***

Why raise the water level on Dauphin Lake?

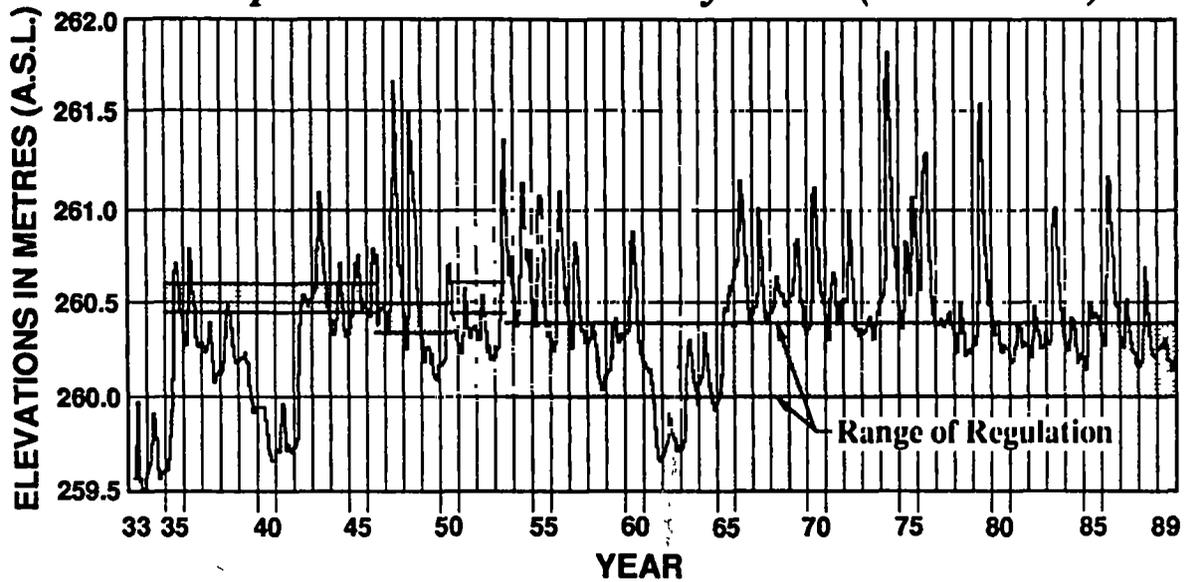
A higher operating level would enhance recreational opportunities, reduce summer fish kill and enhance waterfowl and furbearer habitat around the lake.

The 1st issue is Lake Regulation.

Studies have shown that raising the upper limit another 30 centimetres, to 260.7 metres, would provide a variety of benefits;

A higher operating level would enhance recreational opportunities, reduce summer fish kill and enhance waterfowl and furbearer habitat around the lake.

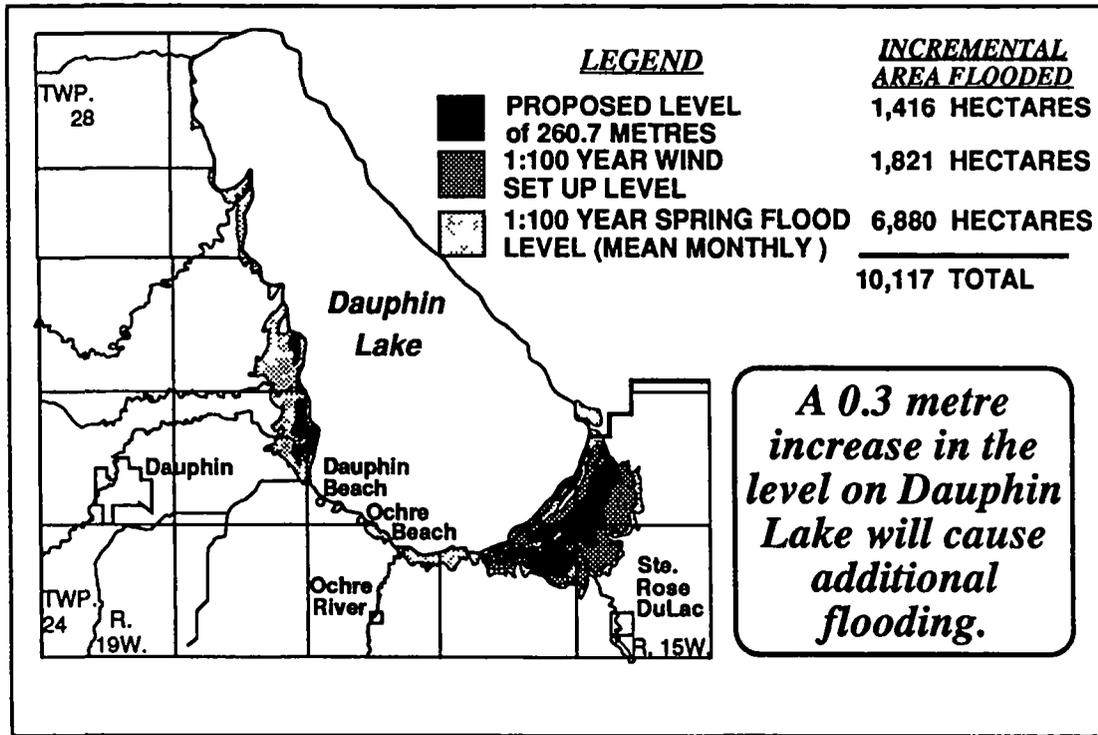
Dauphin Lake Mean Monthly Levels (1933 - 1989)



Dauphin Lake was regulated between 259.9 metres and 260.4 metres above sea level, as shown on this chart.

This range of regulation existed since 1953, some 27 years.

DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER



A 0.3 metre rise in the upper range of regulation would result in additional land below 260.7 metre being flooded, as shown with the black coloured areas on the slide.

An increase in the amount of land periodically flooded by 1 in 100 year wind set-up level would also occur as shown in the _____shaded areas.

Excessive runoff from spring snow melt and heavy rains would create short term flooding in the areas shaded in .

The total land area affected from these occurrences would be 10,117 hectares.

Key Issue - Siltation

Where does the sediment come from?

- 1. Channel erosion - erosion of the stream bed carrying away the bed material such as gravels, shales and silt.**
- 2. Bank erosion - undercutting of the stream banks by swiftly flowing water eventually causes the bank to collapse and contributes to the overall sediment load.**
- 3. Sheet & gully erosion - uncontrolled runoff from agricultural fields carrying away the topsoil.**

The 2nd key issue deals with siltation.

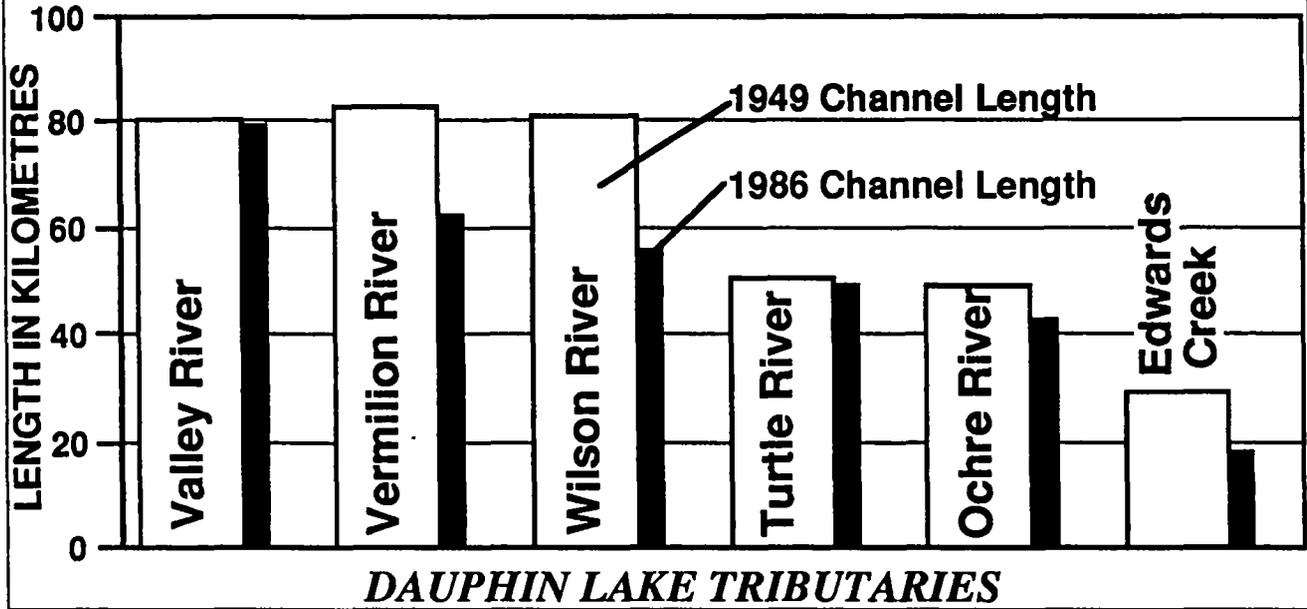
The siltation of Dauphin Lake is the result of a serious erosion problem throughout the basin. Where does the sediment come from?

- 1) Channel erosion - erosion of the stream bed carrying away the bed material such as gravels, shales and silt.*
- 2) Bank erosion - undercutting of the stream banks by swiftly flowing water which eventually causes the bank to collapse and contributes to the overall sediment load.*
- 3) Sheet & Gully erosion - uncontrolled runoff from agricultural fields carrying away the topsoil.*

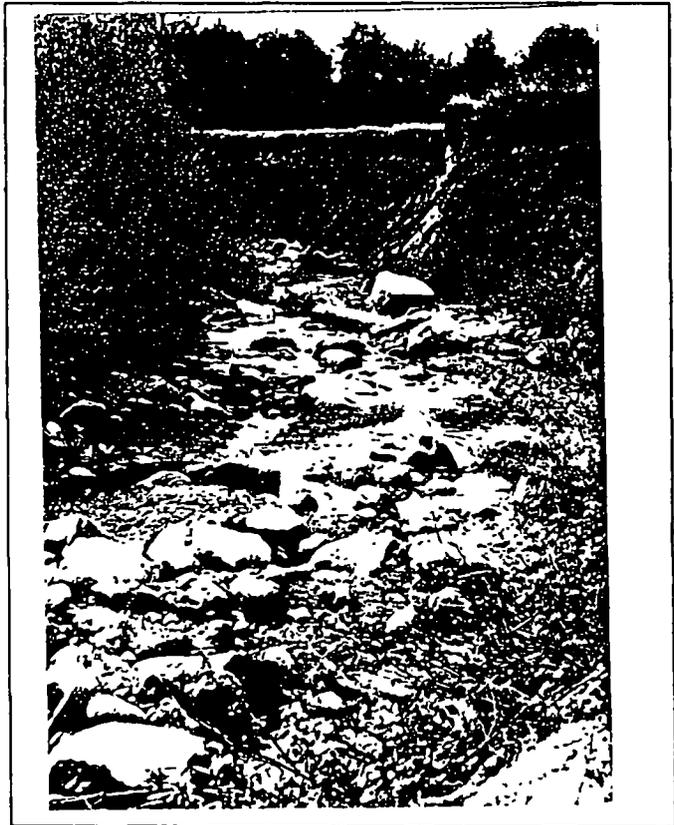
Soil deposited in the lake originates from natural stream channels, degrading man - made drainage channels, particularly those that cross the alluvial plain area at the foot of the escarpment, and from the ever increasing cleared farm land in the basin.

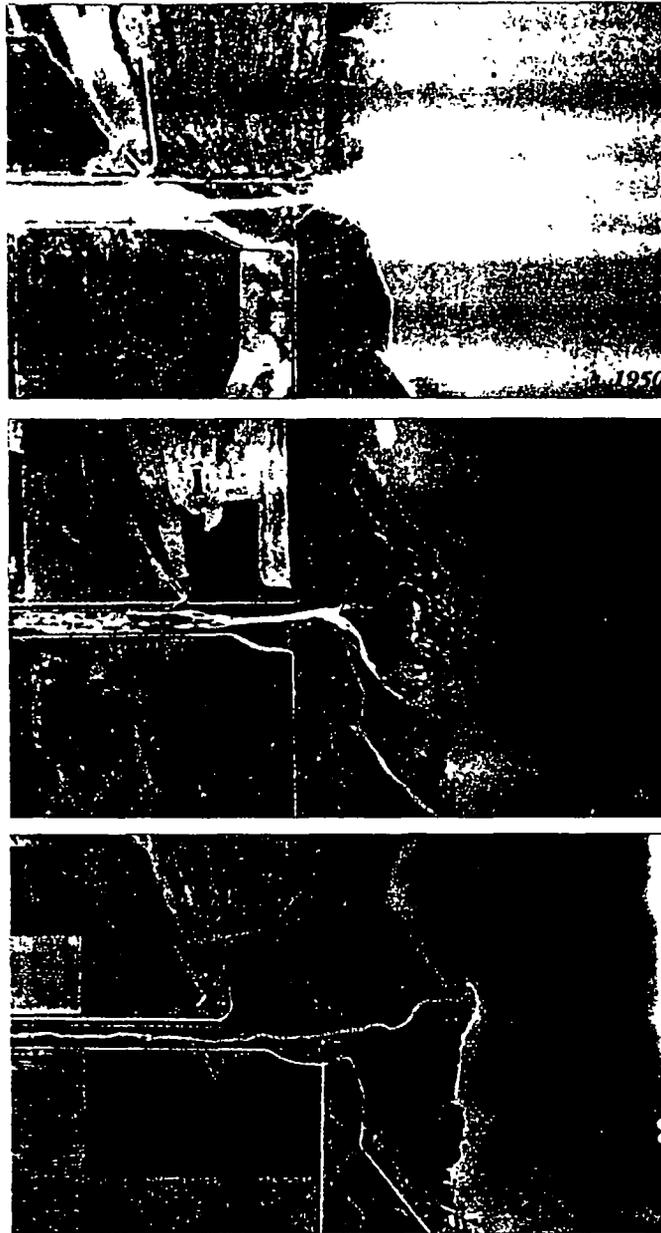
On average, about 508,000 tonnes of sediment per year enter into Dauphin Lake from tributary streams. Approximately 99 percent of this sediment remains trapped in the lake. This siltation, if left unchecked, will continue to reduce the average volume of the lake by some 4% per 110 years. At these rates the lake would be completely filled in about 2300 years, and the surrounding area would become a low marshy area subject to frequent flooding.

Since 1949 some 66 kilometres of stream length has been lost in the Dauphin Lake Basin due to channel straightening. The resulting gradient increase has caused erosion of channel banks and beds, thereby increasing the overall siltation contribution to Dauphin Lake.



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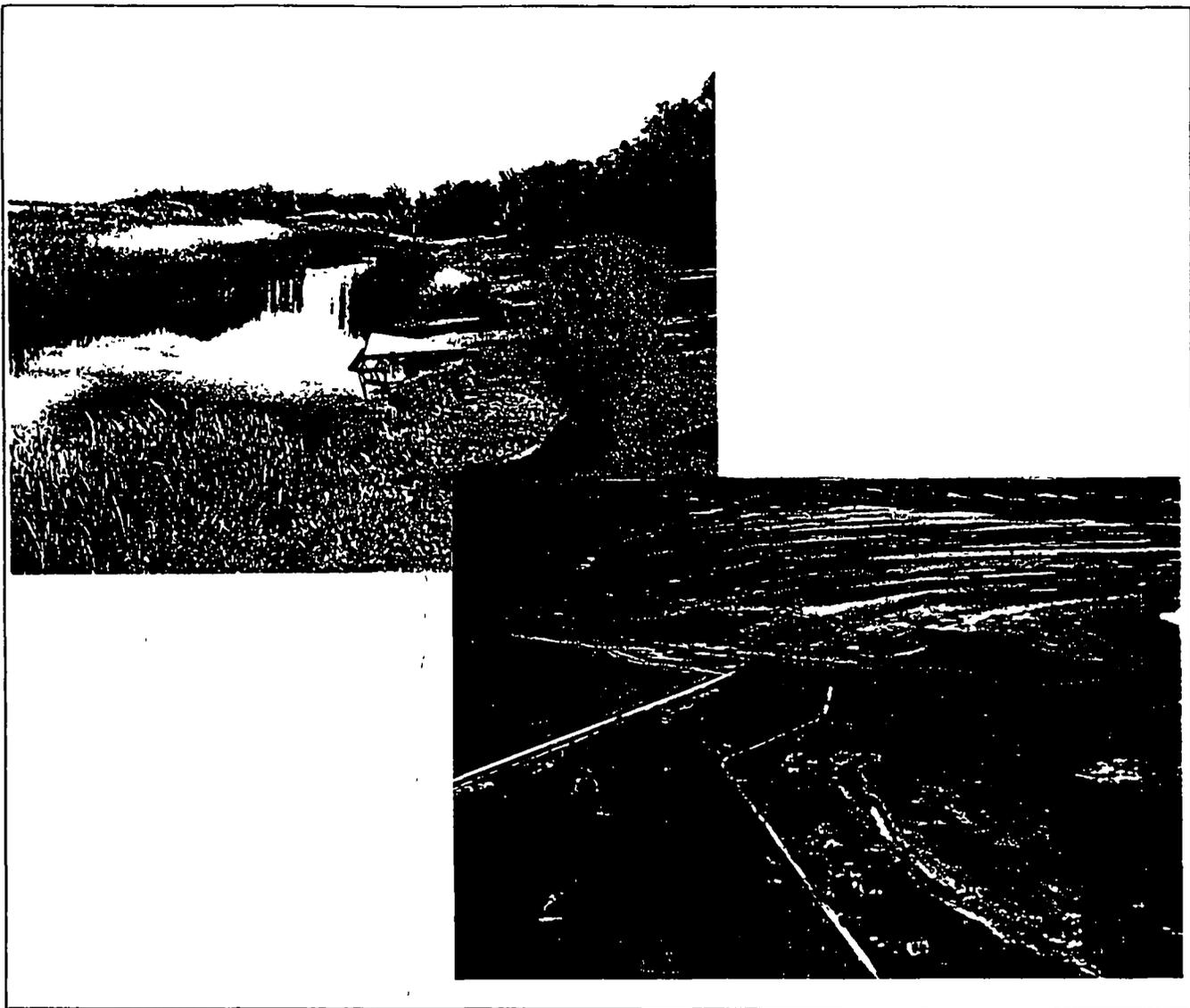


The above series of 3 slides shows the development of a delta at the outlet of Edwards Creek in Dauphin Lake.

The photo's were taken in 1950, 1962 and 1981. (Please note north - south municipal road.)

Historically, alluvial fans at the base of the escarpment provided water storage capability and acted as silt traps. Drainage and other stream development activities have increased runoff through the fans and the silt that formerly settled in these fans is now carried further downstream and much of it settles in Dauphin Lake.

DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER



Here we see vividly what has happened at Oako Beach where silt carried into the lake by Edwards Creek has formed a delta overgrown with vegetation (top left) blocking access to the lake.

Key Issue - Water Quality

What affects the water quality of Dauphin Lake?

- 1. *Silt deposition* - Nutrients in the soil are carried by runoff from fields and are transported via major streams to Dauphin Lake with the silt particles.**
- 2. *Animal wastes* - Animal waste from runoff are carried by streamflow to Dauphin Lake where they recycle in the lake and produce algae.**
- 3. *Sewage* - It is estimated that households in the Dauphin Lake basin contribute approximately 6-7% of the average annual total phosphorous loading into the lake.**

The 3rd key issue is Water Quality.

What affects the water quality of Dauphin Lake ?

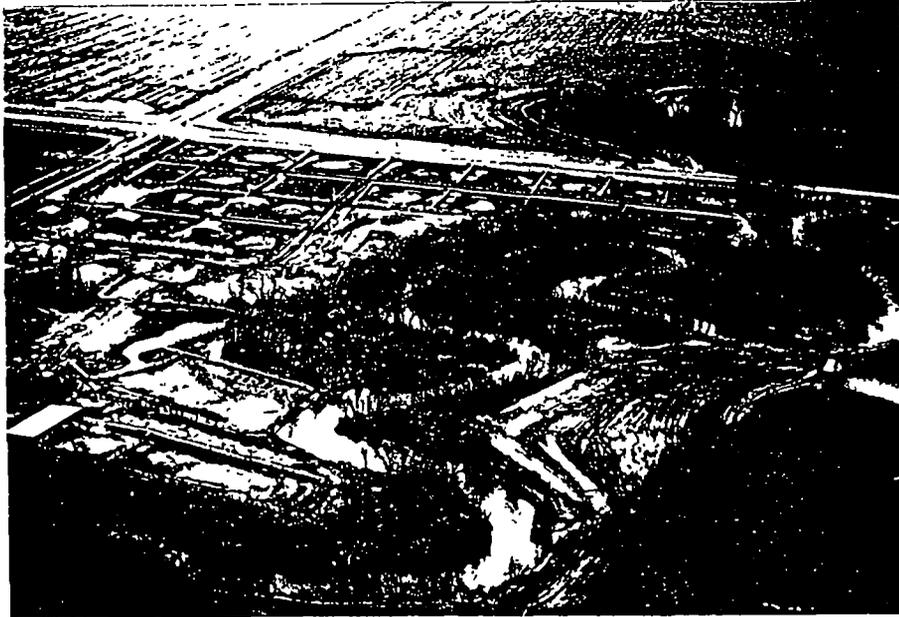
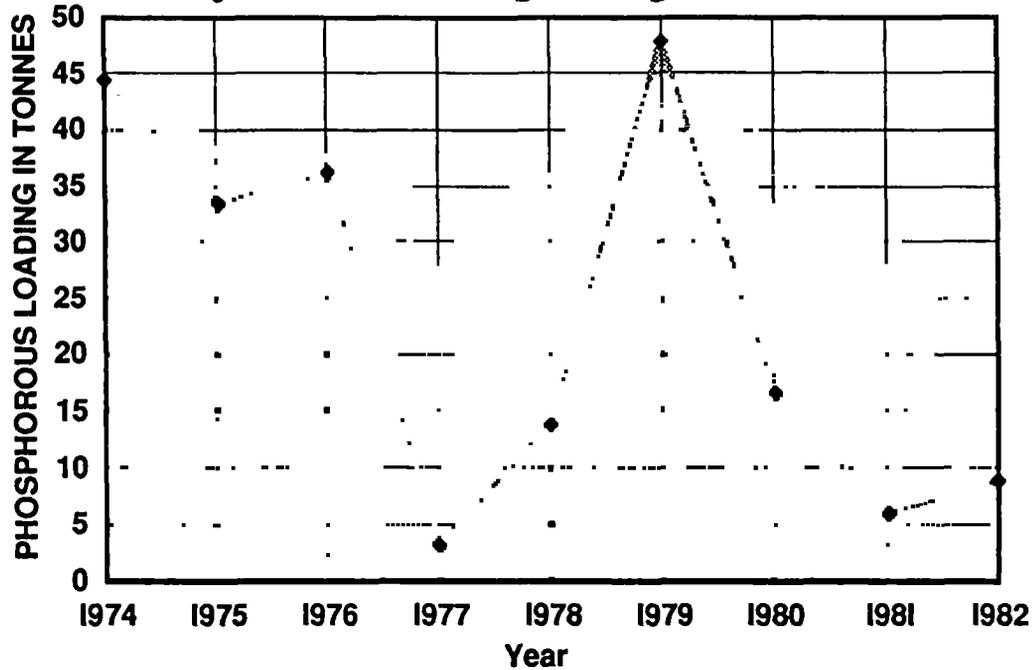
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Siltation and nutrient overloading are the primary cause of the eutrophic conditions in Dauphin Lake.

Nutrients are of substantial concern because of the role they play in algae production. Nutrient overload promotes excessive algae production that can result in fish kill. The primary sources of nutrients are from agricultural fields and runoff from livestock operations. Domestic sewage, particularly from urban areas, it is also an important source of nutrients.

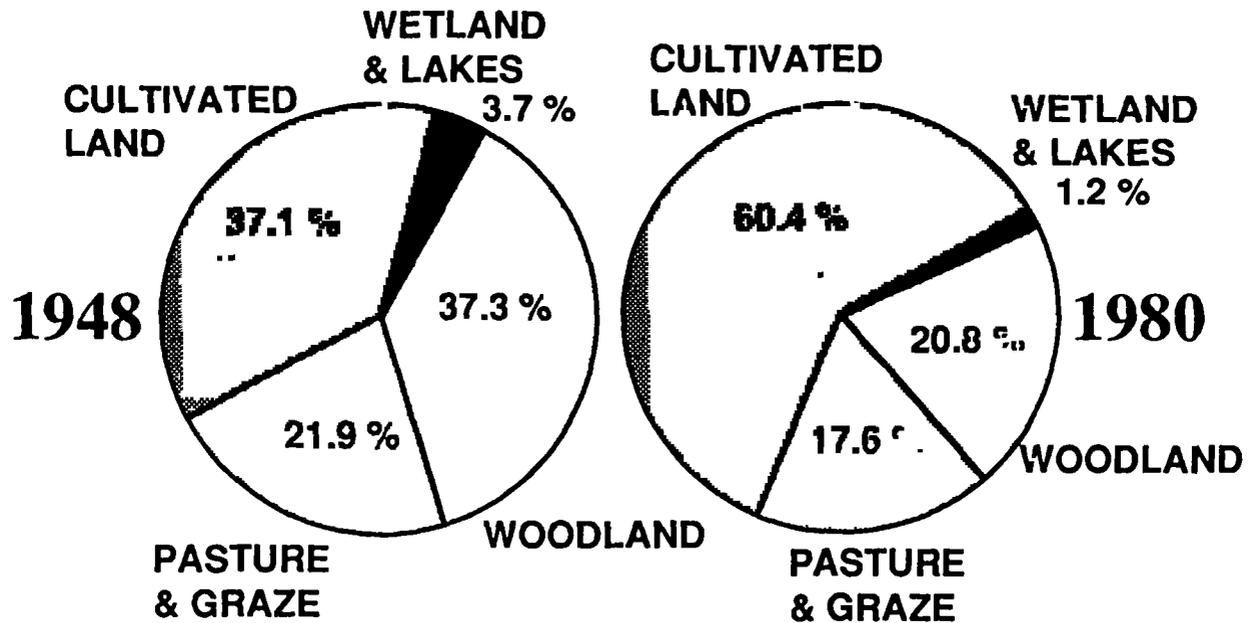
DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER

Phosphorous supply is usually the most important factor controlling the algae in lakes



Nutrients cannot be seen directly in the water because they are usually present in concentrations less than 0.0001%. However, the effects of the nutrients present is readily visible in the form of masses of algae. For example, one kilogram of biologically available phosphorous can stimulate the growth of from one to twelve tonnes of algae.

Cultivated land in the Valley River watershed has increased from 37% of the total in 1948 to almost 61% by 1980



Cultivated land in the Valley River watershed has increased from 37% of the total in 1948 to almost 61% by 1980.

Woodland has decreased. Pasture & graze land has decreased. Wetland & lakes has also decreased.

Key Issue - Fisheries

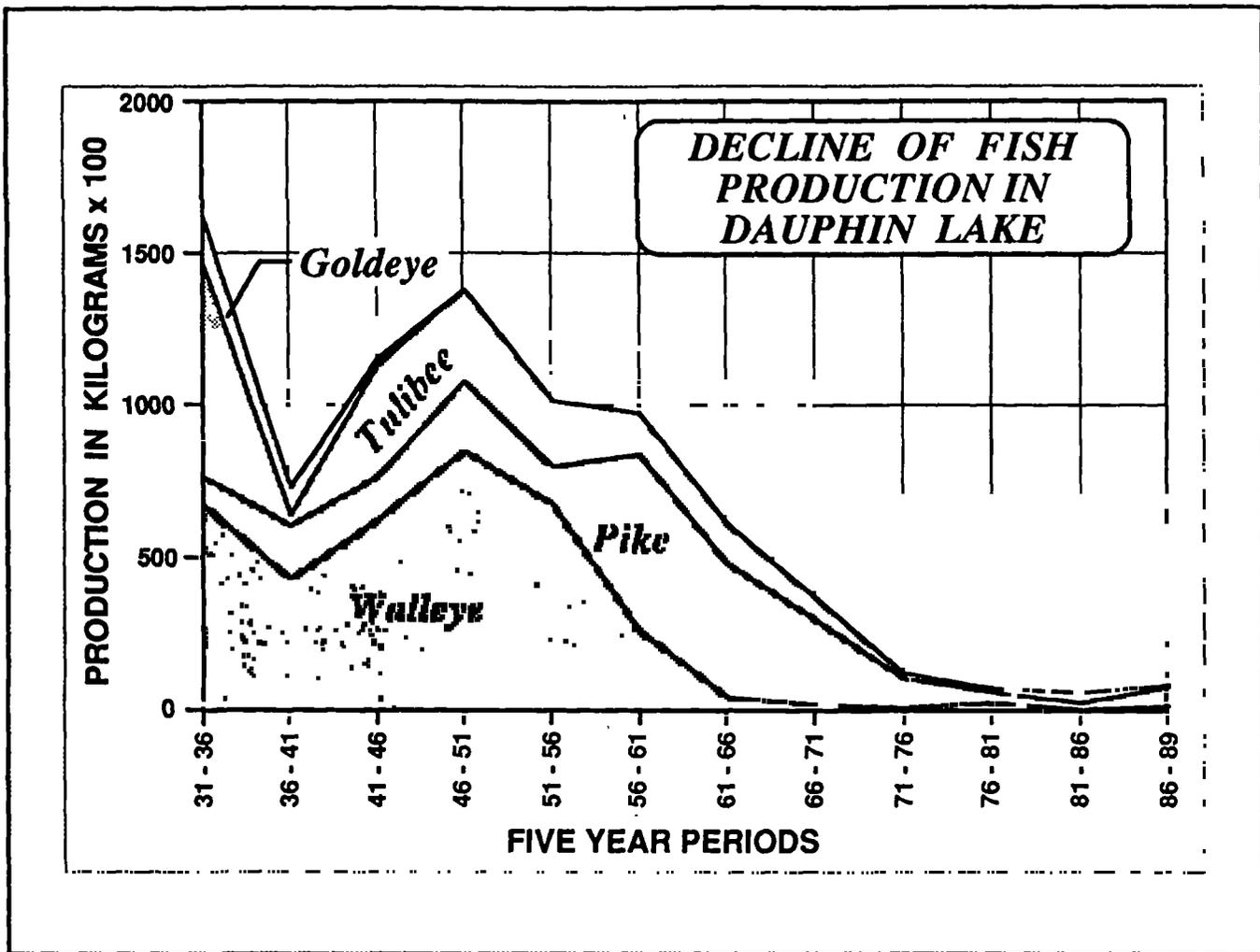
Why has the fishery failed on Dauphin Lake?

**The decline is due largely to
destruction of the fish habitat
brought on by siltation, channelization, land
clearing and other agricultural practices.**

The 4th key issue is fisheries.

The decline in the fish population of Dauphin Lake cannot be attributed to a single cause.

The decline is due largely to destruction of the fish habitat brought on by siltation, channelization, land clearing and other agricultural practices.



Dauphin Lake once supported a thriving and substantial commercial and sport fishery. The lake was regarded as one of the most productive in Manitoba.

In recent years production of the more valuable species has declined drastically. The resultant decrease in catches on the lake has produced a dramatic reduction in the economic performance of commercial and sport fisheries as well as negatively affecting the recreational potential in the area.

What Are We Doing Now?

Recent Initiatives

- CONSERVATION DISTRICTS
- AGRI-FOOD PROGRAMS
- HABITAT HERITAGE CORP.
- MANITOBA FISHERIES BRANCH
- WATER RESOURCES BRANCH
- CANADA FISHERIES & OCEANS
- MANITOBA ENVIRONMENT
- SOILS ACCORD
- PRAIRIE CARE PROGRAM
- WILDLIFE HABITAT CANADA
- ENVIRONMENTAL PARTNERS FUND
- SPECIAL CONSERVATION FUND
- HABITAT ENHANCEMENT LAND USE PROGRAM (HELP)
- HERITAGE MARSHES ADVISORY BOARD

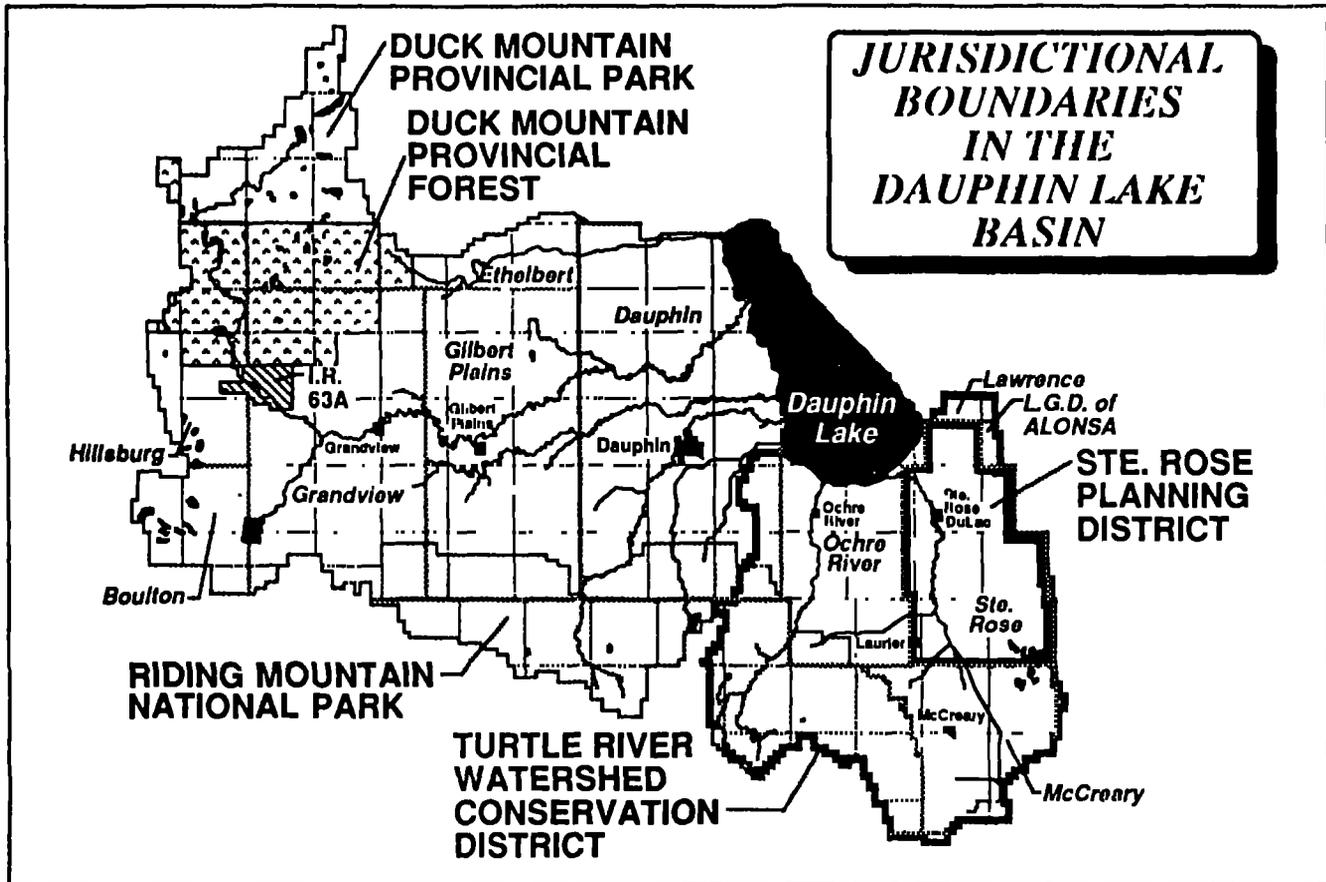
The basin's natural resources are currently being planned and managed by various agencies and organizations, through a variety of programs and projects, with current spending at an estimated \$1.1 million annually.

14 such programs, groups and boards are listed here.

The current level of spending in the basin, and the number of good resource programs now in operation, present resource managers with an opportunity to get basin restoration underway without having to spend a great deal of time seeking funds or devising programs.

Initiatives currently underway in the basin could provide a base on which to build programs.

DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER



The Dauphin Lake Basin advisory board represents all the various jurisdictions in the basin.

Within the basin we have the Duck Mountain Provincial Park and Provincial Forest, the Riding Mountain National Park, the Turtle River Watershed Conservation District, the Ste. Rose Planning District, the Valley River Indian Reserve, several municipalities, towns and villages.

A natural resource problem of this magnitude is not confined to single ownerships, single resources, or single resource users, nor can it be solved by a single agency or group.

It will take a partnership of government and the advisory board to agree on a course of action to help restore the health of Dauphin Lake Basin.

THE EFFECTS OF PROSPECTIVE OPTIONS ON THE KEY ISSUES IN THE DAUPHIN LAKE BASIN

Prospective Program	Lake	Water		
	Regulation	Siltation	Quality	Fisheries
Headwater Retention	○	●	●	○
Fish Spawning Habitat		●	○	●
Lake Dauphin Regulation & Crown Land Management	●	○	●	●
Water Quality Monitoring		○	○	○
Sediment Monitoring		●	●	●
Velocity Control Structures		●	●	●
Turtle River Marsh		○	○	●
Stream Riparian Zone		●	●	●
Marginal Agricultural Land	●	●	○	
Recreational Enhancement				
Alluvial Fan Management		●	●	●
On-Farm Runoff & Erosion Control		●	●	●
Edwards Creek Silt Trap		●	●	●
Basin Research	○	○	○	○
Conservation Education		●	●	●
Basin Awareness Centre	○	●	●	●
Public Consultation	●	●	●	●

LEGEND

● MAJOR EFFECT

◐ MEDIUM EFFECT

○ LITTLE EFFECT

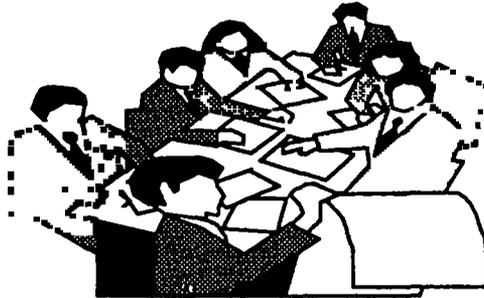
NO EFFECT

The 17 options as shown listed on this slide with their magnitude of effect are not necessarily the only ones or the best choices for reclaiming the basin.

However, they are representative of initiatives and projects suggested in basin studies and investigations, and are shown here to serve as a starting point for discussing nuts and bolts measures for reclaiming the basin.

Whether these or other options are selected, there is strong likelihood that many projects will prove successful only if basin residents and involved jurisdictions help put them into effect. This is particularly true of programs involving the land, since much of the basin is privately owned.

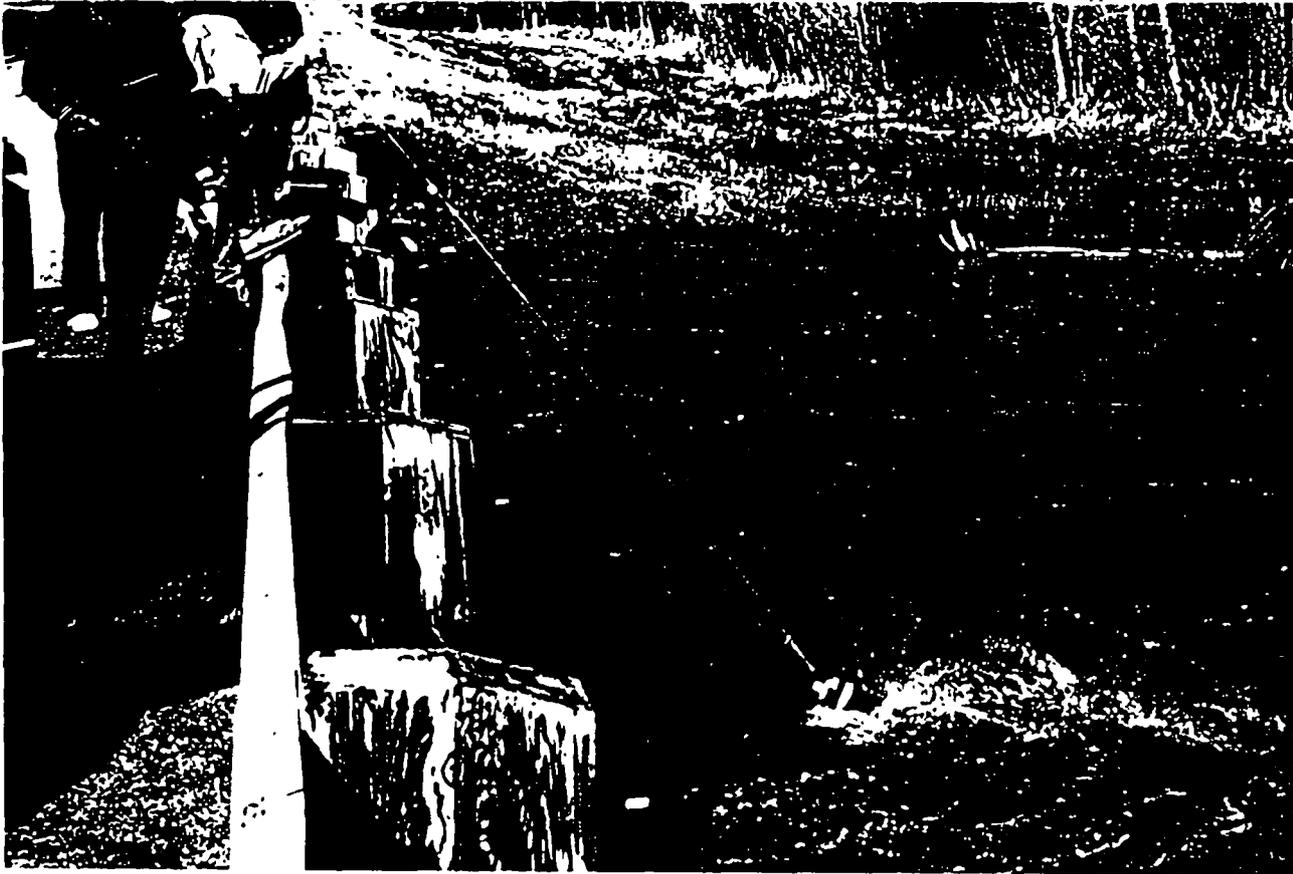
1990 BOARD INITIATIVES



- A - WATER QUALITY MONITORING
- B - EDUCATION AND PUBLIC AWARENESS
- C - LAKE LEVEL
- D - DIVERSION OF EDWARD'S CREEK DRAIN
- E - FARMING FOR TOMORROW PROGRAM
- F - BEACH FRONT MAINTENANCE
- G - FISHERIES ENHANCEMENT

In order to understand the issues and options, the executive worked hard during the months of February, March and April. A seven point initiative for 1990 was finalized by the executive after 10 meetings and given to the 48 member board for approval.

On May 16, 1990 the board approved the proposed initiatives for the Minister's advice and guidance. The Minister of Natural Resources, on August 24, 1990 accepted the following 1990 initiative package for action.



A - WATER QUALITY MONITORING

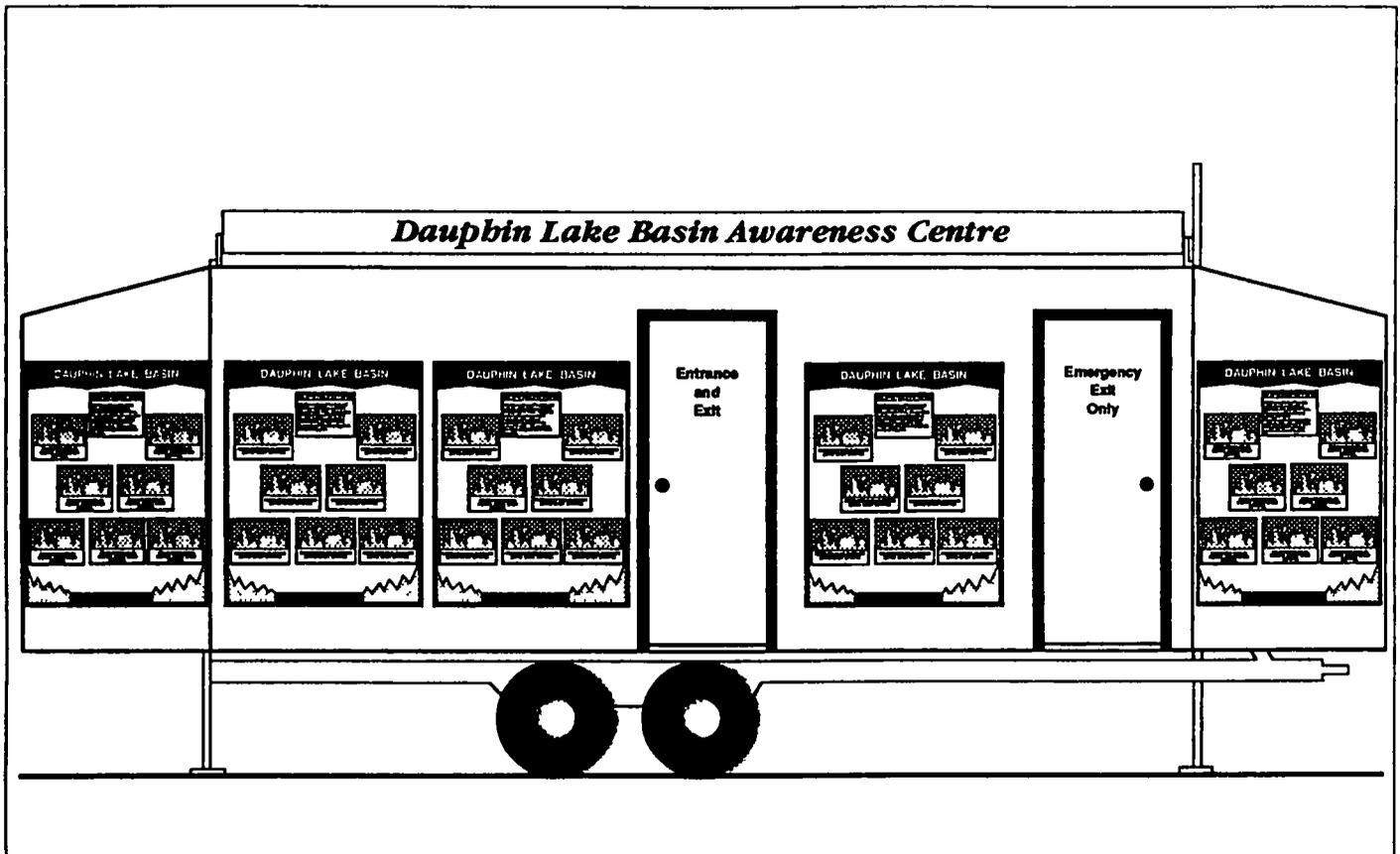
A water quality and sediment monitoring program was carried out at 22 stations during the snow melt water runoff in April, 1990.

At the end of May, a water quality monitoring program began at 16 stations on a bi-weekly basis during the open water season and on a once-a-month basis during the 1990 / 1991 winter season.

This water quality monitoring program was coordinated by the executive with sampling performed by public volunteers. The sample analysis was carried out by the Department of Environment.

The program cost was approximately \$32,000. These programs have been continued for 1991.

DAUPHIN LAKE BASIN - PEOPLE WORKING TOGETHER



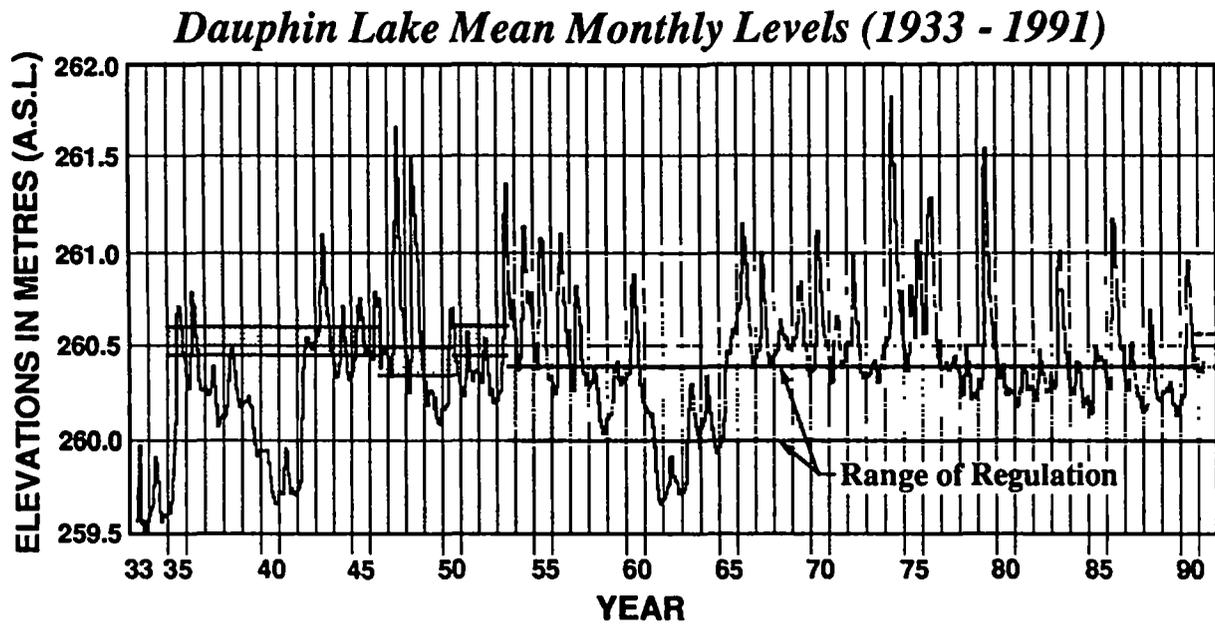
B - EDUCATION AND PUBLIC AWARENESS

The Board has given high priority to education and public awareness. Basin residents talking and working together is the key to sustaining our society and our environment.

In order to reach the grass roots of the basin, a twenty foot trailer was obtained and outfitted with audio and visual displays. This mobile awareness centre began to travel throughout the basin in June, 1991 to communicate the basin's restoration message at fairs, exhibitions, festivals, schools, public gatherings and other basin events.

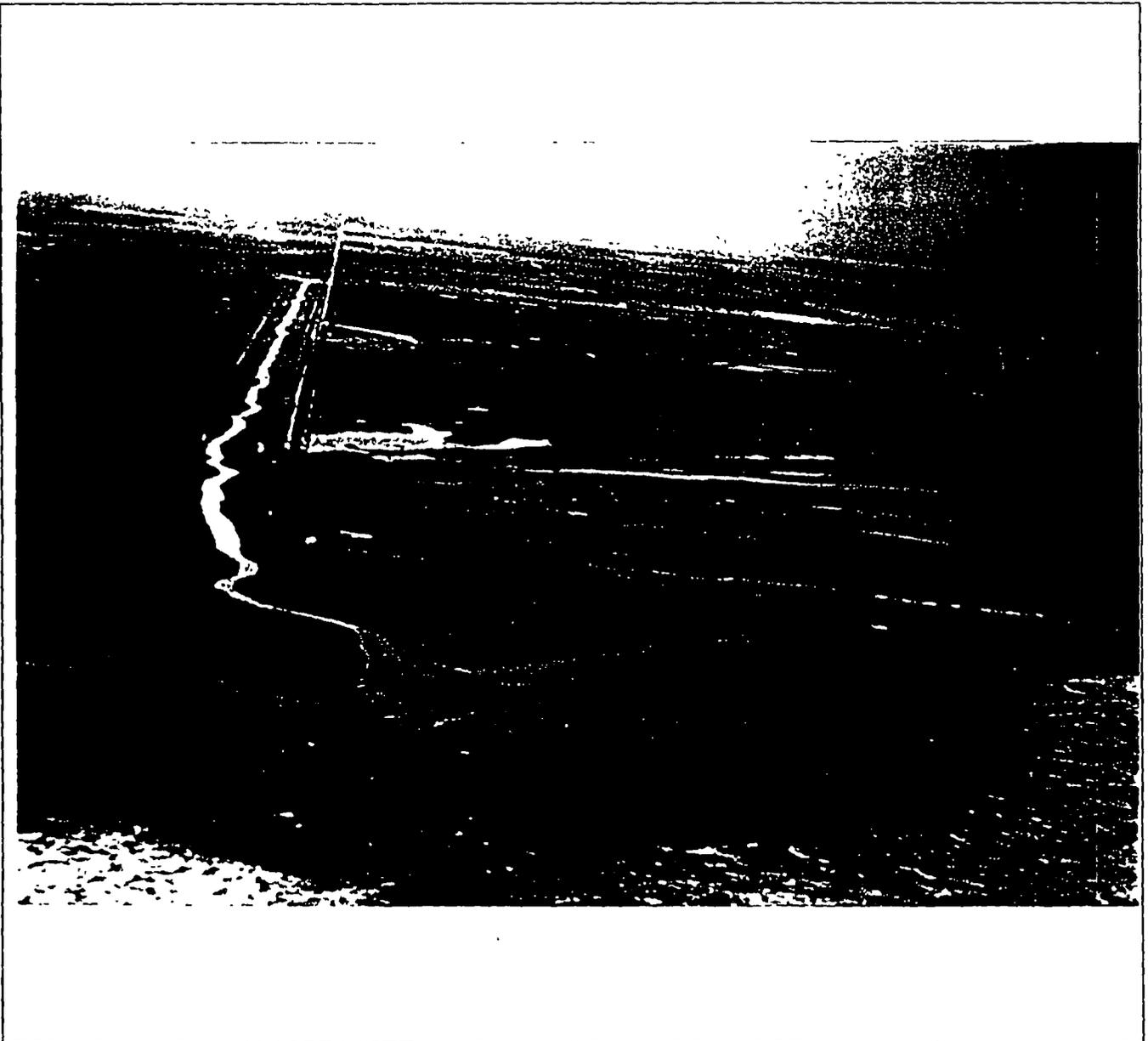
A grant of \$ 7,500 from the Special Conservation Fund generated from Manitoba Lotteries revenue was used towards setting up the mobile awareness centre.

This centre has also received funding for one year from the Environmental Sustainability Initiatives Program. The \$27,000 grant was used to purchase audio-visual equipment, displays, a 3D basin model, and to pay the salaries and expenses for two summer students.



C - LAKE LEVEL

The Minister was advised and has agreed to increase the upper limit of the range of regulation by 15 centimetres. A questionnaire was sent out to the basin residents in the fall of 1990, seeking their reaction to the higher experimental lake level. The questionnaire results have been summarized and the Board has decided to keep the higher upper limit in place for another season. Another questionnaire will be sent out in late 1991 to monitor the 1991 lake level reaction.



D - DIVERSION OF EDWARD'S CREEK DRAIN

The Minister has agreed to carry out a feasibility study and conceptual design of the proposed diversion of Edward's Creek Drain outlet into Dauphin Lake.

This study report has been submitted to the Advisory Board for their review.



E - FARMING FOR TOMORROW PROGRAM

The implementation committee for the Canada / Manitoba Soil Conservation Agreement has added new money to the Farming for Tomorrow Program. One million dollars has been allocated to "address long standing site specific problems along the Manitoba escarpment by funding structural measures such as sediment traps, small dams and large gully stabilization (rehabilitation)."

The one million dollars is comprised of \$380,000 from the Department of Natural Resources and \$620,000 from P.F.R.A.

A good portion of this new money will be spent in the basin as the Advisory Board had requested by means of two local organizations under the agreement.



F - BEACH FRONT MAINTENANCE

Funding from the Special Conservation Fund of the Manitoba Lotteries Foundation will provide \$2,000 for the maintenance of beach fronts where access has been denied as a direct result of siltation. The Dauphin Lake Basin Advisory Board received these funds and the Cottage Committee will carry out the work required.

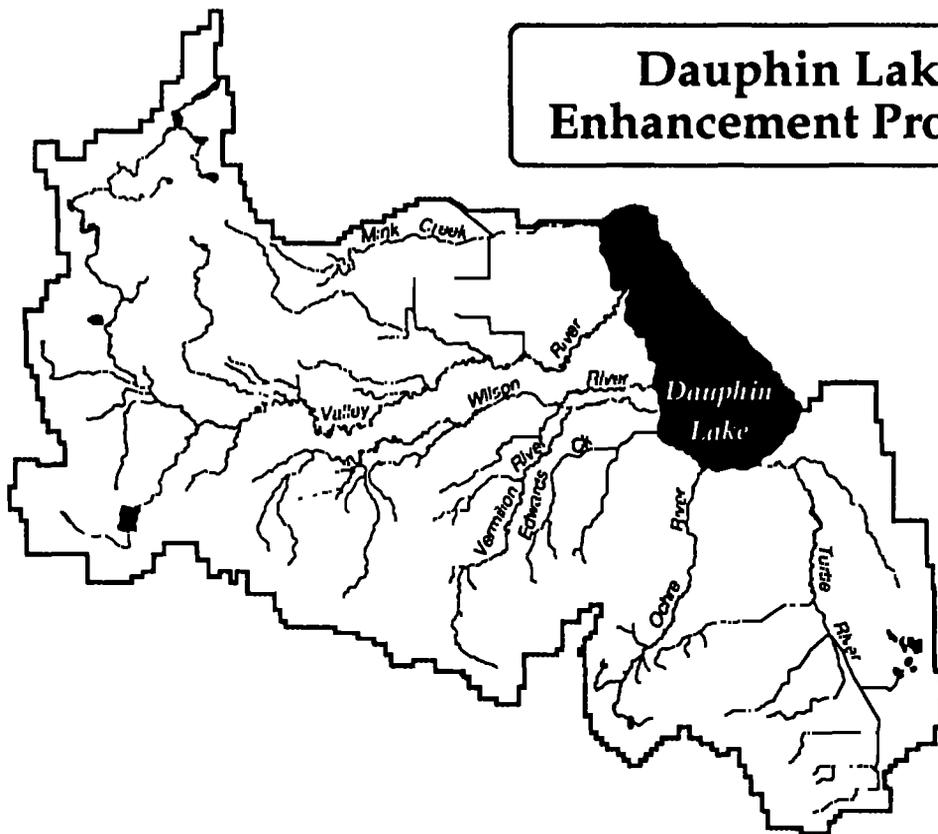


G - FISHERIES ENHANCEMENT

The Water Resources Branch funded additional pool and riffle sites and channel bottom works along the Edwards Creek Drain. Approximately \$10,000 was spent for this initiative in the fall of 1990.

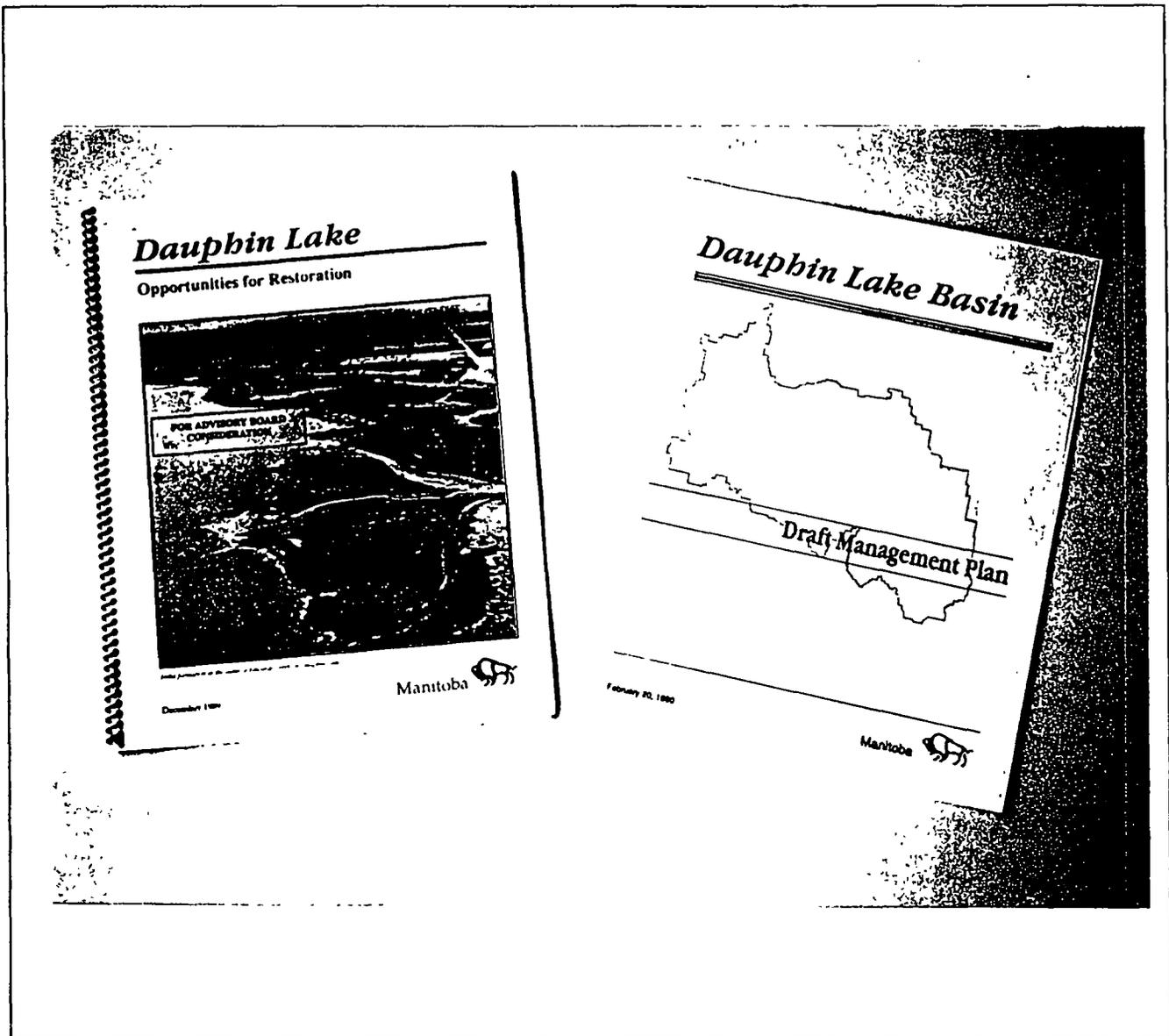
***“WORKING TOGETHER for
the HEALTH of the BASIN”***

**Dauphin Lake
Enhancement Program**



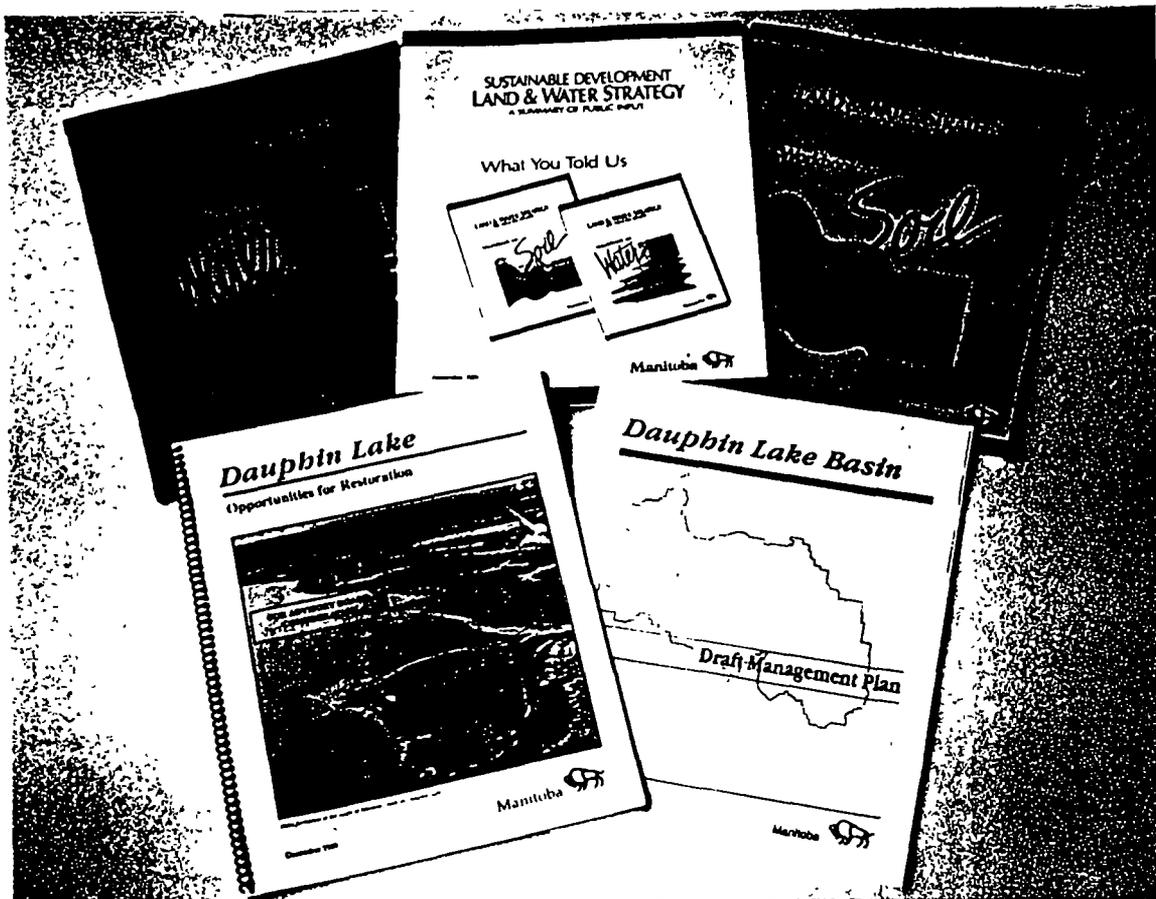
Dauphin Lake Basin Advisory Board

As you can see, the challenge of working together for the health of the basin has been met and the process towards reclaiming the basin is working.



The Task has just begun. The Board is now working together to begin the process of producing a living Management / Action Plan for the basin. The development of this plan will involve the basin residents. Together, the residents, the Advisory Board, the Technical Advisory Group and the Minister of Natural Resources will share their experience, knowledge and opinions with each other.

Sustainable Development is a grass-roots concept, It depends on the active involvement and participation of all citizens to find solutions to problems, identify opportunities and mold the type of society that meets our needs and those of future generations.

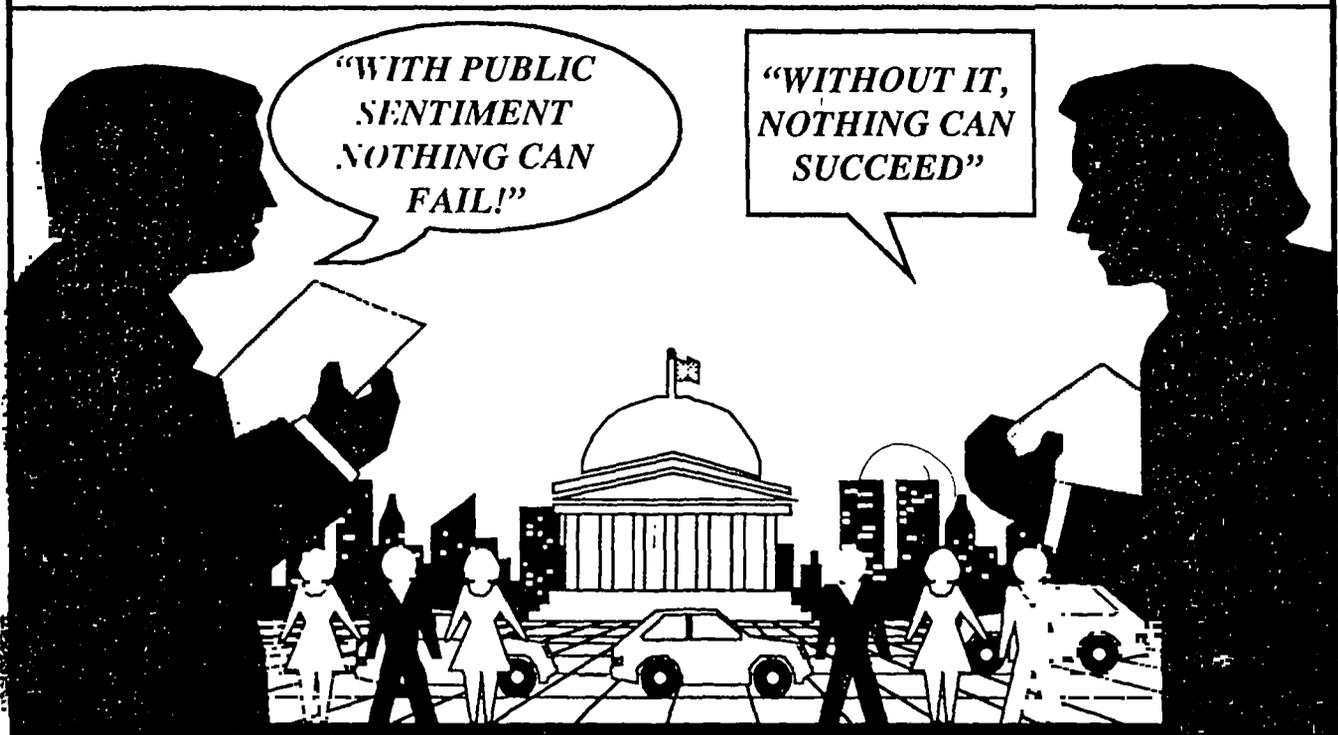


The Land and Water Strategy for Manitoba is a fundamental component of Sustainable Development. The process of public consultation on the Water and Soil Policies was the first step towards this development.

The Dauphin Lake Basin Advisory Board is an example of a "Round Table" at the local level. The basin's future will be in harmony with Canada's Green Plan.

The Dauphin Lake Basin Management / Action Plan, when developed, will no doubt be a model for others to follow in "Sustaining our Society" or in other words changing the way we see the environment and its relationship to our activities.

“PUBLIC SENTIMENT IS EVERYTHING”



The Dauphin Lake Basin - People working together is an example of a quotation made by Abraham Lincoln many years ago.

“ Public sentiment is everything, with public sentiment nothing can fail; without it nothing can succeed.”

