

Minnesota Board of Water and Soil Resources. Minutes.

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Version 3
August 20, 2018

MINNESOTA BOARD OF WATER AND SOIL RESOURCES

MINUTES OF THE MEETING HELD
OCTOBER 25, 1989

Appointed Members in Attendance
Donald Ogaard
John Williamson
John Boulton
Doug Bade
Loni Kemp
Howard Peterson
William Cofell
Ken Schellack
Jack Graba
John Brooks, Jr.
Loren Harste
Don Warner
Lowell Moen

Appointed Members Absent
Eugene Kalmes
Natalie Haas Steffen
James Hoese

Others In Attendance
Wayne Anderson, Minnesota Pollution Control Agency
Paul Burns and Kim Benson, Minnesota Department of Agriculture
Dr. George Foster, University of Minnesota
Laural Reeves, Minnesota Department of Natural Resources
Al Dornfeld and Warren Wallgren, Minnesota Association of Watershed Districts
D'Wayne DeZiel and Ken Pederson, Minnesota Association of Soil and Water Conservation Districts
Franklin Denn, Minnesota Association of Townships
Jon DeGroot, Soil Conservation Service
Bruce Olsen, Minnesota Department of Health
John Wells and Marilyn Lundberg, State Planning Agency
Representative Phyllis Kahn
John Velin, Legislative Commission on Minnesota Resources
C. Merle Anderson, Watonwan SWCD
Lester Rechow, Watonwan County Commissioner

Others in Attendance (continued)
Ed Kruft and Bill Alden, Hubbard SWCD
Dale Krystosek, John Cronemiller, Gail Scarey, Wes Frenzel, and Cliff Tweeddale, Beltrami SWCD
Milayne Larson and Warren Larson, Clearwater SWCD

Staff Present
Jim Birkholz
Pat Bloomgren
Mel Sinn
Greg Larson
Wayne Edgerton
Steve Miller
Bruce Sandstrom
Doug Thomas
Dan Steward
Chris Hughes
Darrell Apelgrain
Denice DeFrates
Mark Nelson
Mary Jo Anderson

Meeting Called to Order - Chairman Ogaard called the meeting to order at 9:10 a.m. at the Golden Steer, South St. Paul, Minnesota.

** 89-85 Adopt Agenda - Moved by Williamson, seconded by Harste, to adopt the agenda as presented. Affirmative: Ogaard, Williamson, Boulton, Bade, Kemp, Schellack, Harste, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

Approval of Minutes of September 27, 1989 - Jon DeGroot, Soil Conservation Service, stated that a correction is needed on page 5. It should state that Roger Mussetter is the Assistant State Conservationist. ** 89-86 Moved by Cofell, seconded by Peterson, to approve the minutes of September 27, 1989, as corrected. Affirmative: Ogaard, Williamson, Boulton, Bade, Kemp, Schellack, Harste, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

Chairman's Report - Chairman Ogaard briefly commented on the issue of chemical usage in the Red River Valley. He next reported on the hearing he chaired for the Board's Dispute Resolution Committee regarding the Forest Lake WMO plan on October 24, 1989, in Forest Lake.

Chairman Ogaard reported that the Minnesota Department of Agriculture by order of Commissioner Jim Nichols will no longer provide accounting services to the Board of Water and Soil Resources. This order greatly accelerated a transition which was to occur over a one year period. The Department of Agriculture has established charges for services, including meeting room charges. He commended staff for doing an excellent job during this transition phase.

Chairman Ogaard reported that the "Coping with Cattail Conflicts" conference has been scheduled for November 14, 1989, at St. John's University in Collegeville. He encouraged Board members to attend. He has also been asked to sit on the Education Advisory Council at the University of Minnesota/Crookston.

Don Warner, Lowell Moen, and Paul Burns entered the meeting at 9:20 a.m.

Executive Director's Report - Jim Birkholz updated the Board on the MDA/BWSR Memo of Understanding regarding accounting. Jim reported that MDA doesn't want to provide support services in accounting any longer. Staff was working on a gradual transitional plan. Commissioner Nichols' timeline was to do it now rather than gradually. Effective October 13, BWSR staff will now be handling all accounting, audit, and payroll transactions. Staff will be trained to process the transactions. Staff will be reassigned and work put on hold as needed to keep accounting functions progressing. The ongoing

working relationships with the divisions and staff of MDA will continue. MDA staff will continue to administer some personnel functions, but BWSR staff will be trained to do all personnel functions in the future.

The Legislative Water Commission held its first meeting on October 23, 1989. The Chairman of the Commission is Senator Steve Morse, Vice-Chairman is Representative Willard Munger, and the Secretary of the Commission is Representative Elton Redalen. The Legislative Water Commission showed alot of interest in the recent RIM sign-up and the Environmental Agriculturalist Education Program.

Jim reported on the Board's legislative status. Drafting is proceeding on four proposals: 1) Update of Soil Loss Limits; 2) BWSR/MDA administrative relationship; 3) Cost-Share; and 4) technical amendment to new grants program. The special levy issue is on hold until assessment of implications of the Tax Bill.

Jim reported that he and Howard Peterson will be attending the Natural Resource Congress meeting on October 28, 1989, which is being conducted to gather imput for LCMR on the strategic plan for the Environmental Trust Fund. He will be a co-presenter at several sessions dealing with the RIM program.

Jim reported on the following upcoming meetings:
- October 31, BWSR/PCA Memo of Understanding meeting, this document will be brought before the Board for review.
- November 1-2, New SWCD Employees Orientation, being conducted by the BWSR at the Park Inn, in Alexandria.
- November 8, Northfield, informational meeting regarding establishing a project in the Cannon River Watershed.
Watershed District.

Jim Birkholz reported on the staffing status. A field hydrologist, Bill Best, has been hired for Bemidji. He will start working in mid-November. A temporary hydrologist has been hired, Said Hanoon, replacing Joseph Richter. Said is a civil engineer and will be working on task force projects. Two field supervisory positions have been established by upgrading existing field staff positions. Interviews will be held on November 7. Interviews for the forestry and accounting positions to assist SWCDs will be conducted this month. Interviews were held yesterday for the geohydrologist position in the central office. The position will be offered to one of the three finalists.

Chairman Ogaard reported that the Minnesota Department of Agriculture has requested that a representative of the BWSR serve on the Pesticide Application Advisory Review

Board. Chairman Ogaard asked for volunteers. Don Warner and Doug Bade were interested. Chairman Ogaard will make the selection. He stated that this is a good opportunity to continue the working relationship with MDA.

EQB/Water Resources Committee Report - Loni Kemp reported that she and Pat Bloomgren attended the Water Resources Committee meeting on October 5, 1989. It was decided that the "Water Billboard" would be continued on a bimonthly basis, using the state's centralized mailing system. Agencies would contribute to the cost of mailing, as it costs approximately $15,000 per year to distribute the "Water Billboard". Loni reported that a draft ten-year agenda on Minnesota Water Resources was approved to be sent to the LCMR Citizens Advisory Committee. This document will be discussed more at future WRC meetings. Loni reported that the Water Resources Committee discussed how to deal with agency legislative initiatives. Each agency will select legislative initiatives they would like endorsed by EQB/WRC. Loni reported that the State Nonpoint Source Groundwater Plan is now available from PCA.

BWSR Award Program Nominee - Loni Kemp nominated "Agri News" to receive an award from the BWSR. An informational fact sheet on why they deserve the award was available for the Board's review. Moved by Kemp, seconded by Cofell, that "Agri News" receive an award from the BWSR to be presented at a monthly meeting. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Kemp, Schellack, Harste, Moen, Graba, Brooks, Peterson, and Cofell. Opposed: None. Carried.

** 89-87

First Quarter Budget Report - Jim Birkholz updated the Board on the status of the budget. He distributed an informational budget report for the Board's review.

Expense Report Update - Jim Birkholz asked Board members to total their expense claims when they submit them, this will assist staff in the new processing procedures.

Assessment of Tax Bill Impact on BWSR Programs - Greg Larson reported on the tax bill passed in special session. The state will be reviewing financial aid to mandated and non-mandated programs, also at wealth disparities. Greg reported that special levies were authorized for 1989, 1990, and 1991 for soil surveys.

** 89-88

Tabled Item from 9/27/89 BWSR Meeting - Clay SWCD Cost-Share Request - Moved by Schellack, seconded by Boulton, to bring this tabled issue back before the Board. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Kemp, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried. Greg Larson distributed copies of a letter to the Board from the Sellin Brothers. Greg reported that the project is done, the contractor language is that the standard bid document is an approximate bid only. Staff is concerned as to the reaction unsuccessful bidders will have

if BWSR grants additional funds for this project. Staff recommendation is not to pay.

** 89-89 Discussion followed. Moved by Kemp, seconded by Cofell, that the Clay SWCD cost-share request for additional funding be denied. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Kemp, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

Chairman Ogaard recessed the meeting for a break at 10:30 a.m. The meeting reconvened at 10: 40 a.m.

Wellhead Protection Video - Chairman Ogaard introduced Bruce Olson, Minnesota Department of Health. Mr. Olson distributed an information fact sheet on the Wellhead Protection Program in Minnesota. He then showed a video explaining the program as well. Mr. Olson stated that the video was funded by the McKnight Foundation. A question and answer period followed.

110B Comprehensive Local Water Plans - Doug Thomas reported that the first 110B Comprehensive Local Water Plans from Watonwan, Beltrami, and Clearwater SWCDs are brought before the Board today for approval each having met all requirements of law and

** 89-90 rule. Moved by Boulton, seconded by Williamson, to approve the Watonwan SWCD 110B CLWP. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Kemp, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

** 89-91 Moved by Brooks, Jr., seconded by Moen, to approve the Beltrami SWCD 110B CLWP. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Kemp, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

** 89-92 Moved by Brooks, Jr., seconded by Moen, to approve the Clearwater SWCD 110B CLWP. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Kemp, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

The following people were introduced and briefly commented on the water plan approvals: LCMR Chairperson, Representative Phyllis Kahn; John Velin, LCMR; John Wells and Marilyn Lundberg, State Planning Agency; C. Merle Anderson, Watonwan SWCD, and Watonwan County Commissioner Lester Rechow; Dale Krystosek, Wes Frenzel, and John Cronemiller, Beltrami SWCD; Gail Skare, Beltrami County Commissioner; Cliff Tweeddale, Headwaters Regional Development Commission; Warren Larson and Milayne Larson, Clearwater SWCD. A photo session was then held as the approved comprehensive local water plans were signed.

Chairman Ogaard recessed the meeting for lunch at 11:50 A.m. The meeting reconvened at 1:00 p.m.

Loni Kemp did not return to the meeting after lunch.

Howard Peterson reported that he, Bill Cofell, and John Boulton attended the Lake Management Conference at the Hyatt Regency in Minneapolis on October 2-3. Several staff also attended and made excellent presentations.

Overview of Hubbard County Water Plan - Dan Steward introduced Ed Kruft and Bill Alden, Hubbard SWCD. An overview summary was distributed for the Board's information and review.

East Central Administrative Region Report - Mark Nelson distributed an informational summary sheet and updated the Board on various projects and programs in the area.

Advisors' Comments

- Franklin Denn, Minnesota Association of Townships, stated that considerable time has been spent on reviewing the tax bill, which will affect townships on recycling efforts and the fence law. Mr. Denn reported that considerable working cooperation is needed with the water plans and land use plans.

- D'Wayne DeZiel, Minnesota Association of Soil and Water Conservation Districts, invited the Board to attend the MASWCD Annual Convention on December 4-6, 1989, at the Kahler Hotel in Rochester.

- Al Dornfeld, Minnesota Association of Watershed Districts, invited the Board to attend the "Coping with Cattail Conflicts" conference on November 14, 1989, at St. John's University in Collegeville. He also invited everyone to attend the MAWD Annual Convention on November 30 - December 1, 1989, at the Arrowwood Lodge in Alexandria.

- Jon DeGroot, Soil Conservation Service, reported that the "SCS Continuing Resolution" for funding runs out at midnight tonight, October 25. Jon DeGroot introduced Mike Price, Public Affairs Specialist. Mr. Price showed the video "Conservation On Your Own", and distributed a summary fact sheet for the Board's information. He asked for potential distributors of the video, which includes eight tapes of different conservation practices.

RIM Reserve Program - Wayne Edgerton distributed a summary report of the RIM sign-up period, which ended October 6. SWCDs will have until November 8, to prioritize applications. Wayne stated that $4.4 million is available of the $6.3 million applied for.

** 89-93 The "Allocation of RIM Service Grants to SWCDs" was reviewed by the Board. Moved by Graba, seconded by Schellack, to approve the RIM service grant allocations to SWCDs as presented. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

Proposed Curtis Arndt, Cottonwood County, RIM land exchange - the Board reviewed the informational memo regarding the land exchange. Staff proposed three recommendations, which include a one-time land exchange. Moved by Harste, seconded by Bade, to approve the Curtis Arndt RIM land exchange, with three staff recommendations. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

** 89-94

Metro Water Planning - Bruce Sandstrom gave an overview of the Rice Creek WMO plan and the West Mississippi WMO plan for the Board's information. Bruce gave a status report on each of the current 509 plans.

Minnesota Forestry Improvement Program Allocations - Greg Larson reviewed the allocations with the Board. The sign-up concluded on September 28, with a total allocation of $114,000. Moved by Brooks, Jr., seconded by Bade, to approve the staff recommended Minnesota Forestry Improvement Program allocations totalling $114,000. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

** 89-95

Chairman Ogaard suggested finding a permanent location for the monthly Board meetings. Several options were discussed, such as a public facility (such as Met Council Chambers); a hotel would be convenient (catering needs as well as sleeping rooms available); somewhere with adequate parking; out of the center of the city; rotate meeting locations. Staff will check into these options.

Bill Cofell encouraged Board members to read "Conquest of the Land Over 7,000 Years". Also copies of an article from the "Journal of Soil and Water Conservation" was distributed for Board members review.

** 89-96 Moved by Warner, seconded by Brooks, Jr., to adjourn the meeting at 3:10 p.m. Affirmative: Ogaard, Williamson, Boulton, Warner, Bade, Schellack, Harste, Moen, Graba, Brooks, Jr., Peterson, and Cofell. Opposed: None. Carried.

Respectfully submitted,

Donald Ogaard

Donald Ogaard
Chairman

Minnesota Board of Water & Soil Resources

Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, Minnesota 55107

(612) 296-3767

October 17, 1989

TO: Board of Water and Soil Resources Members, Staff, and Advisors

FROM: Jim Birkholz, Executive Director

SUBJECT: October 25, 1989 Board Meeting

Enclosed is the agenda for the October 25, BWSR meeting.

PLEASE NOTE THE MEETING LOCATION HAS CHANGED TO THE GOLDEN STEER, 1010 SOUTH CONCORD STREET, SOUTH ST. PAUL, MINNESOTA.

The meeting location has been changed do to a shift in our administrative relationship with the Department of Agriculture. Effective October 13, 1989, our staff has assumed responsibility for all accounting transactions formerly carried out by the Department of Agriculture accounting staff. Commissioner Nichols ordered this change and also established a new fee schedule for rental of conference room space at the department. He has since retracted the conference room charge for the remainder of the fiscal year but in the interim we made arrangements for the October meeting at the Golden Steer. Suffice it to say we are scrambling to carry out all the necessary accounting transactions while receiving some limited short-term assistance from Department of Agriculture staff. One of the items which you as Board Members can help with is to fill out your expense reports more completely than you have been required in the past. We will discuss this and related items at the Board meeting.

Following is information about agenda items:

- 110B Comprehensive Local Water Plans. The first three plans, Watonwan, Beltrami, and Clearwater Counties, are scheduled for approval at the meeting. This is a significant landmark achievement as the initial local water plans go from the approval phase to the implementation phase. Staff is awaiting minor additions to the plans and anticipates recommendations for approval at the meeting.

Regional Offices

Northwest Region
1819 Bemidji Ave.
Bemidji, MN 56601
218-755-3963

Northeast Region
Government Service Center
320 W. 2nd Street
Room 603
Duluth, MN 55802
218-723-4752

West Central Region
611 Iowa Avenue
Staples, MN 56479
218-894-1692

South Central Region
Box 756
New Ulm, MN 56073
507-354-2196

Southeast Region
Friedell Bldg., Room 100
1200 S. Broadway
Rochester, MN 55904
507-285-7458

Southwest Region
Box 111
1400 E. Lyon Street
Marshall, MN 56258
507-537-7260

East Central Region
Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, MN 55107
612-296-3767

An Equal
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Representatives from the Legislative Commission on Minnesota Resources and the State Planning Agency have also been invited for this agenda item. Board staff and Bill Alden from the Hubbard SWCD, will overview the Hubbard County plan. Also enclosed in the packet you will find a 110B Comprehensive Water Planning County Status Report for your review.

- RIM Reserve Program. The latest sign-up for the RIM Reserve Program resulted in approximately $6.3 million worth of sign-ups with approximately $4.4 million in funds available for the program. SWCD staff will spend the next month conducting preliminary easement work to determine the feasibility of all the applicants. Also local screening committees will meet to prioritize the applications. At the October meeting you will be requested to approve the allocation of the service grants to SWCDs to implement the easements. Attached is a preliminary staff recommendation for the administrative payments. Also enclosed is a summary of the preliminary sign-up information. One additional item is action on the proposed Curtis Arndt RIM land exchange in Cottonwood County. Enclosed you will find a staff review of the proposal and a recommendation. Staff recommends approval of this land exchange under certain conditions.

- Metropolitan Water Planning. Two plan overviews are scheduled along with a status report. No plans are scheduled for approval this month.

- Minnesota Forestry Improvement Program. The results of the MFIP sign-up which ended September 28, are being compiled by DNR and BWSR staff, and will be available at the meeting. Applications have exceeded available funds. The joint DNR/BWSR staff recommendations will be brought to the Board for decision.

Please call Chairman Ogaard or myself if you need additional information about the meeting. Please remember the change in meeting location. Travel safely, we'll see you at the Golden Steer on the 25th!

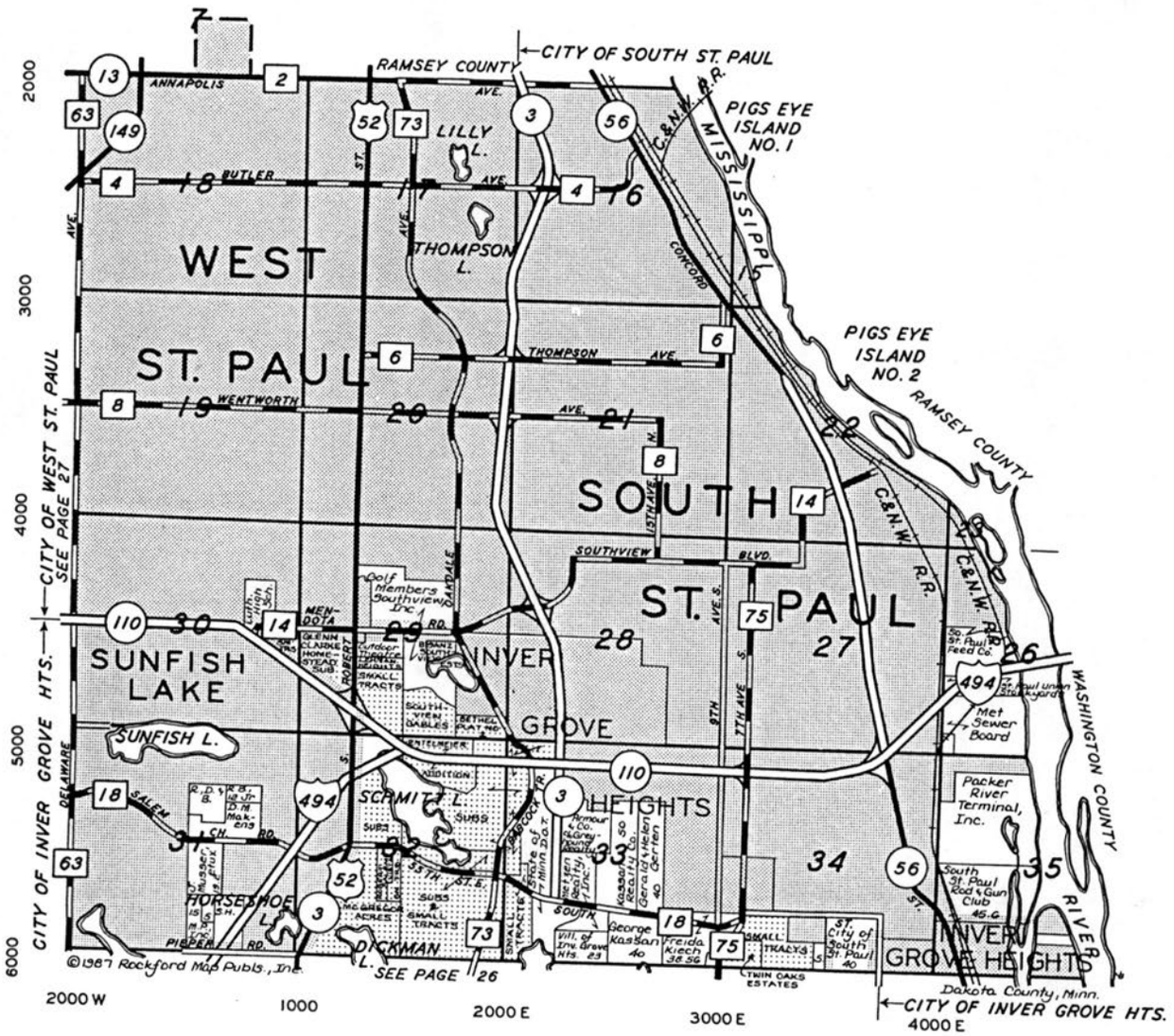
BOARD OF WATER AND SOIL RESOURCES
GOLDEN STEER
SOUTH ST. PAUL, MINNESOTA
OCTOBER 25, 1989

PRELIMINARY AGENDA

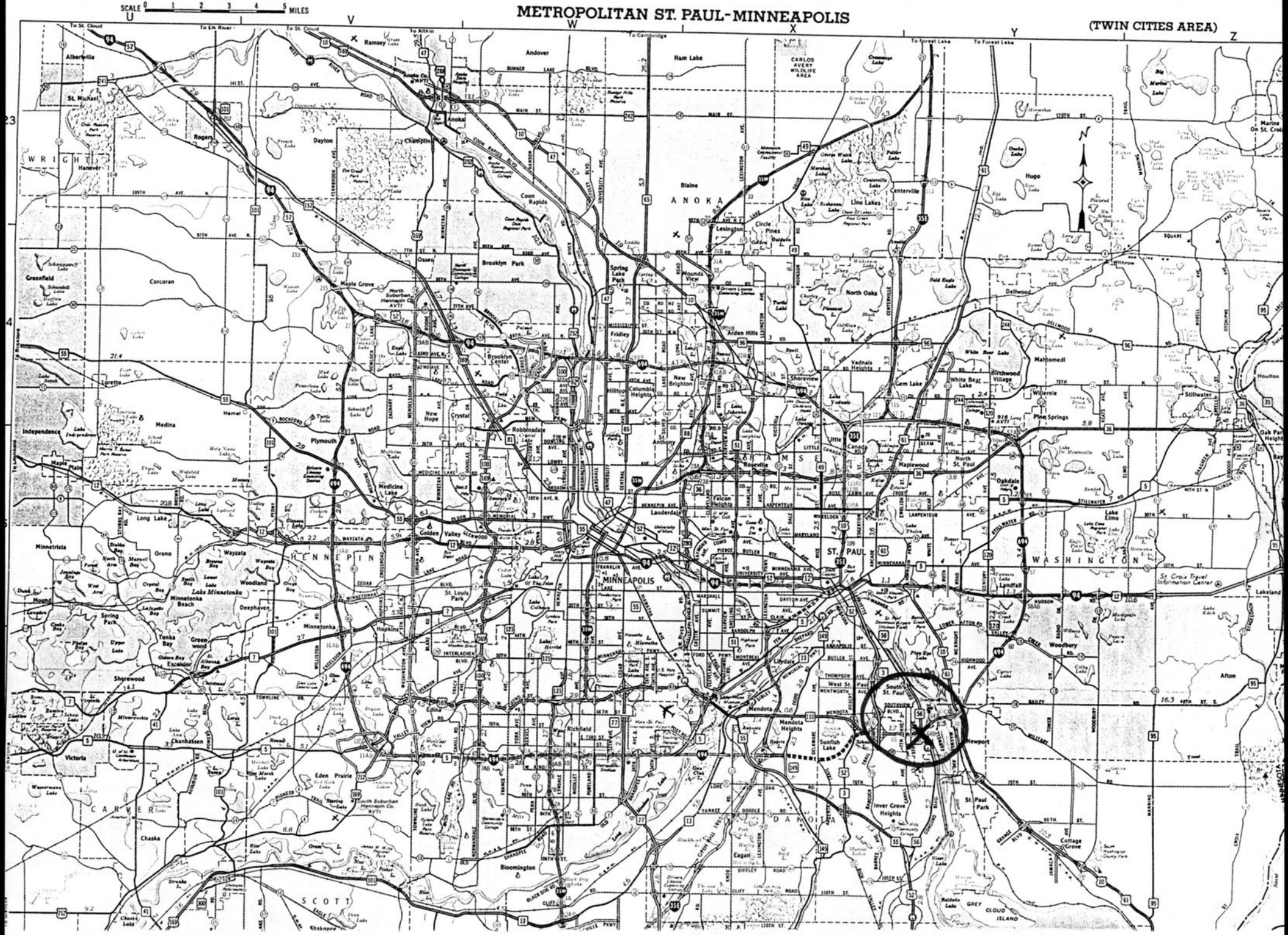
9:00 a.m.	1.	Call to Order
	2.	Adopt Agenda
	3.	Approval of Minutes of September 27, 1989
	4.	Reports - Chairman's Report -- Donald Ogaard - Executive Director's Report -- Jim Birkholz - first quarter budget report - expense report update - EQB/Water Resources Committee Report -- Loni Kemp - Assessment of tax bill impact on BWSR programs -- Greg Larson - Tabled item from 9/27/89 meeting -- Clay SWCD cost-share request
10:00	5.	Wellhead Protection Video -- Bruce Olson, Minnesota Department of Health
10:30	6.	East Central Administrative Region Report -- Mark Nelson
11:00	7.	110B Comprehensive Local Water Plans - Plans for approval: Watonwan, Beltrami, Clearwater - Plan overview: Hubbard County -- Dan Steward and Bill Alden, Hubbard SWCD - Status Report
	8.	Advisors' Comments
Noon		Lunch
1:00 p.m.	9.	RIM Reserve Program - Sign-up results -- for information - Allocation of service grants to SWCDs -- for decision - Proposed Curtis Arndt, Cottonwood County, RIM land exchange -- for decision
2:00	10.	Metropolitan Water Planning - Plan Overviews: Rice Creek WMO and West Mississippi WMO - Status Report - No plan approvals
2:30	11.	Minnesota Forestry Improvement Program allocations - for decision -- Greg Larson
3:00		Adjourn

28 CITY OF WEST ST. PAUL NORTH PART CITY OF SOUTH ST. PAUL
NORTH PART CITY OF INVER GROVE HEIGHTS

T. 28N.-R. 22W.



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METROPOLITAN ST. PAUL-MINNEAPOLIS
(TWIN CITIES AREA)
SCALE 0 1 2 3 4 5 MILES
U V W X Y Z
23 4 5
N
WRIGHT
ANOKA
HENNEPIN
RAMSEY
WASHINGTON
CARVER
SCOTT
DAKOTA
MINNEAPOLIS
ST. PAUL
Albertville
St. Michael
Rogers
Hanover
Dayton
Champlin
Anoka
Ramsey
Andover
Ham Lake
Blaine
Coon Rapids
Lino Lakes
Centerville
Hugo
Greenfield
Corcoran
Maple Grove
Osseo
Brooklyn Park
Brooklyn Center
Spring Lake Park
Fridley
Mounds View
North Oaks
Arden Hills
Vadnais Heights
Gem Lake
Mahtomedi
White Bear Lake
Birchwood Village
Willernie
Stillwater
Pine Springs
Loretto
Hamel
Medina
Independence
Maple Plain
Plymouth
New Hope
Crystal
Robbinsdale
New Brighton
Columbia Heights
St. Anthony
Roseville
Little Canada
Maplewood
North St. Paul
Oakdale
Lake Elmo
Long Lake
Orono
Minnetrista
Wayzata
Minnetonka Beach
Lake Minnetonka
Deephaven
Woodland
Medicine Lake
Golden Valley
Lauderdale
Falcon Heights
Lake Como
Landfall
Woodbury
Afton
Shorewood
Excelsior
Tonka Bay
Spring Park
Minnetonka
Hopkins
St. Louis Park
Edina
Richfield
Lyndale
Mendota
Mendota Heights
Sunfish Lake
Newport
South St. Paul
Inver Grove Heights
St. Paul Park
Cottage Grove
Grey Cloud Island
Victoria
Chanhassen
Chaska
Eden Prairie
Bloomington
Eagan
Shakopee
Prior Lake
Savage
Burnsville
Apple Valley
Lakeville
Hastings
Cannon Falls
Red Wing
Northfield
Faribault
Owatonna
Rochester
Albert Lea
Austin
Mankato
New Ulm
Glencoe
Hutchinson
Litchfield
Willmar
Montevideo
Granite Falls
Ortonville
Morris
Alexandria
Detroit Lakes
Fergus Falls
Wadena
Brainerd
Little Falls
Sauk Centre
Melrose
Cold Spring
St. Cloud
Waite Park
Sartell
Sauk Rapids
Princeton
Elk River
Zimmerman
Becker
Big Lake
Monticello
Buffalo
Delano
Watertown
Mayer
Waconia
Chaska
Carlos Avery Wildlife Area
Forest Lake
Marine On St. Croix
Lakeland
St. Croix Travel Information Center
To St. Cloud
To Elk River
To Cambridge
To Forest Lake
To Litchfield
To Redwood Falls
To Mankato
To Faribault
To Northfield
To Hastings
To Red Wing
To Lake City
To Wabasha
To Rochester
To Albert Lea
To Austin
To Owatonna
To New Ulm
To Glencoe
To Hutchinson
To Willmar
To Montevideo
To Granite Falls
To Ortonville
To Morris
To Alexandria
To Detroit Lakes
To Fergus Falls
To Wadena
To Brainerd
To Little Falls
To Sauk Centre
To Melrose
To Cold Spring
To St. Cloud
To Princeton
To Elk River
To Zimmerman
To Becker
To Big Lake
To Monticello
To Buffalo
To Delano
To Watertown
To Mayer
To Waconia
To Chaska
To Shakopee
To Prior Lake
To Savage
To Burnsville
To Apple Valley
To Lakeville
To Hastings
To Cannon Falls
To Red Wing
To Northfield
To Faribault
To Owatonna
To Rochester
To Albert Lea
To Austin
To Mankato
To New Ulm
To Glencoe
To Hutchinson
To Litchfield
To Willmar
To Montevideo
To Granite Falls
To Ortonville
To Morris
To Alexandria
To Detroit Lakes
To Fergus Falls
To Wadena
To Brainerd
To Little Falls
To Sauk Centre
To Melrose
To Cold Spring
To St. Cloud

1989 RIM RESERVE PRELIMINARY SIGNUP INFORMATION
REVISED 10/16/89

area	um	DISTRICT	SENSITIVE GRD. WATER			WETLAND RESTORATION			RIPARIAN LANDS			MARGINAL AG. LANDS			PASTURED HILLSIDES			LIVING SNOWFENCE			GRAND TOTALS		
			# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $
3	1	AITKIN																			0	0.0	$0
4	2	ANOKA																			0	0.0	$0
2	3	BECKER	1	40.0	$10,654	1	14.6	$6,447													2	54.6	$17,101
1	4	BELTRAMI	1	31.4	$5,488							2	28.1	$4,897							3	59.5	$10,385
4	5	BENTON	4	147.0	$66,588							1	43.0	$17,459							5	190.0	$84,047
5	6	BIG STONE				3	98.1	$58,741							5	333.9	$103,977				8	432.0	$162,718
6	7	BLUE EARTH																			0	0.0	$0
6	8	BROWN							3	118.4	$92,018										3	118.4	$92,018
3	9	CARLTON																			0	0.0	$0
4	10	CARVER																			0	0.0	$0
2	11	CASS																			0	0.0	$0
5	12	CHIPPEWA				2	134.0	$145,004				1	8.0	$5,719							3	142.0	$150,723
3	13	CHISAGO				1	25.0	$15,247				1	5.0	$4,051							2	30.0	$19,298
2	14	CLAY										4	258.4	$132,425							4	258.4	$132,425
1	15	CLEARWATER																			0	0.0	$0
3	16	COOK																			0	0.0	$0
5	17	COTTONWOOD				3	83.5	$43,333	1	5.4	$5,030	12	165.6	$175,465	19	367.0	$198,439				35	621.5	$422,267
2	18	CROW WING																			0	0.0	$0
4	19	DAKOTA										1	2.0	$1,400							1	2.0	$1,400
7	20	DODGE				1	7.6	$6,499	1	15.2	$9,217										2	22.8	$15,716
2	21	DOUGLAS				15	393.7	$118,233				13	404.2	$147,127							28	797.9	$265,360
6	22	FARIBAULT	2	75.7	$60,839	6	165.6	$162,115				4	72.5	$66,799							12	313.8	$289,753
7	23	FILLMORE	1	15.1	$5,075										11	420.2	$119,928				12	435.3	$125,003
7	24	FREEBORN				1	10.0	$10,846													1	10.0	$10,846
7	25	GOODHUE							1	5.0	$4,133	5	44.8	$24,374	12	215.4	$80,719				18	265.2	$109,226
2	26	GRANT				1	38.0	$33,011													1	38.0	$33,011
4	27	HENNEPIN																			0	0.0	$0
1	28	HUBBARD										1	17.0	$1,528							1	17.0	$1,528
3	29	ISANTI				7	43.0	$22,754													7	43.0	$22,754
3	30	ITASCA										1	55.0	$9,888							1	55.0	$9,888
5	31	JACKSON				2	19.8	$19,972				1	19.2	$9,657	3	95.0	$48,821				6	134.0	$78,450
3	32	KANABEC																			0	0.0	$0
6	33	KANDIYOHI				8	216.0	$161,645													8	216.0	$161,645
1	34	KITTSON																			0	0.0	$0
3	35	KOOCHICHING																			0	0.0	$0
5	36	LAC QUI PARLE				1	24.2	$12,219				1	5.0	$2,448							2	29.2	$14,667
3	37	LAKE																			0	0.0	$0
1	38	LAKE OF THE WOODS																			0	0.0	$0
6	39	LESUEUR										1	9.7	$5,616							1	9.7	$5,616
5	40	LINCOLN				2	48.2	$32,266							2	103.1	$17,458				4	151.3	$49,724
5	41	LYON										1	13.0	$6,033	3	70.4	$16,689				4	83.4	$22,722
1	42	MAHNOMEN																			0	0.0	$0
1	43	MARSHALL-BELTRAMI																			0	0.0	$0
1	44	MARSHALL										1	20.0	$4,071							1	20.0	$4,071

1989 RIM RESERVE PRELIMINARY SIGNUP INFORMATION
REVISED 10/16/89

area	um	DISTRICT	SENSITIVE GRD. WATER			WETLAND RESTORATION			RIPARIAN LANDS			MARGINAL AG. LANDS			PASTURED HILLSIDES			LIVING SNOWFENCE			GRAND TOTALS		
			# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $
6	45	MARTIN				2	109.9	$70,137	2	28.8	$26,351										4	138.7	$96,488
6	46	MCLEOD				2	55.1	$50,056	1	21.6	$19,079	4	58.3	$49,850							7	135.0	$118,985
6	47	MEEKER				4	176.0	$128,831	2	24.5	$16,143	1	3.1	$2,701							7	203.6	$147,675
3	48	MILLE LACS				2	56.6	$23,315				4	87.8	$34,750							6	144.4	$58,065
2	49	MORRISON	2	54.5	$27,257	8	305.0	$168,343				5	75.9	$22,154	5	121.5	$24,950				20	556.9	$242,704
7	50	MOWER							3	100.0	$90,000	3	56.6	$40,000							6	156.6	$130,000
5	51	MURRAY				1	21.5	$18,435				1	27.4	$14,833	2	74.0	$38,157				4	122.9	$71,425
6	52	NICOLLET										1	4.6	$3,337							1	4.6	$3,337
5	53	NOBLES																			0	0.0	$0
1	54	NORMAN							1	10.2	$4,418	2	69.8	$28,574							3	80.0	$32,992
7	55	OLMSTED										1	5.0	$4,455	4	122.4	$39,293				5	127.4	$43,748
2	56	EAST OTTER TAIL																			0	0.0	$0
2	57	WEST OTTER TAIL																			0	0.0	$0
1	58	PENNINGTON																			0	0.0	$0
3	59	PINE																			0	0.0	$0
5	60	PIPESTONE										1	12.1	$7,014	1	15.4	$6,840				2	27.5	$13,854
1	61	EAST POLK										1	30.0	$11,145							1	30.0	$11,145
1	62	WEST POLK																			0	0.0	$0
2	63	POPE				15	866.2	$510,744	1	5.6	$3,059	3	37.0	$17,631	4	202.0	$50,876				23	1110.8	$582,310
4	64	RAMSEY																			0	0.0	$0
1	65	RED LAKE				1	51.5	$16,000	1	5.2	$1,700	1	30.0	$8,610							3	86.7	$26,310
5	66	REDWOOD							3	49.4	$33,030	3	138.1	$128,777							6	187.5	$161,807
6	67	RENVILLE				4	193.0	$181,195	5	74.1	$53,172	11	267.3	$267,198							20	534.4	$501,565
7	68	RICE				5	82.8	$59,510				2	18.7	$10,679							7	101.5	$70,189
5	69	ROCK				1	26.6	$9,749				1	7.8	$4,194							2	34.4	$13,943
7	70	ROOT RIVER							1	56.0	$16,474	3	34.4	$12,256	14	714.0	$128,344				18	804.4	$157,074
1	71	ROSEAU																			0	0.0	$0
3	72	NORTH ST. LOUIS																			0	0.0	$0
3	73	SOUTH ST. LOUIS																			0	0.0	$0
4	74	SCOTT										2	17.0	$12,224							2	17.0	$12,224
4	75	SHERBURNE																			0	0.0	$0
6	76	SIBLEY				5	69.6	$63,000				3	63.0	$59,800							8	132.6	$122,800
4	77	STEARNS	1	33.8	$9,403	1	19.8	$10,000				1	13.3	$3,622							3	66.9	$23,025
7	78	STEELE										2	23.1	$20,962							2	23.1	$20,962
2	79	STEVENS							3	48.0	$37,407	3	78.1	$57,383	4	131.8	$63,823				10	257.9	$158,613
5	80	SWIFT				3	66.6	$41,000	1	18.6	$13,000	7	259.3	$164,358							11	344.5	$218,358
2	81	TODD																			0	0.0	$0
2	82	TRAVERSE				1	80.0	$60,000													1	80.0	$60,000
7	83	WABASHA				1	12.5	$9,544	2	11.9	$10,317	5	54.0	$36,649	38	1428.1	$541,939				46	1506.5	$598,449
2	84	WADENA	5	86.4	$19,023																5	86.4	$19,023
6	85	WASECA										1	2.3	$1,389	3	58.3	$23,088				4	60.6	$24,477
4	86	WASHINGTON																			0	0.0	$0
6	87	WATONWAN																			0	0.0	$0
2	88	WILKIN																			0	0.0	$0
7	89	WINONA										1	10.2	$4,519	5	144.0	$41,411				6	154.2	$45,930

1989 RIM RESERVE PRELIMINARY SIGNUP INFORMATION
REVISED 10/16/89

area	um	DISTRICT	SENSITIVE GRD. WATER			WETLAND RESTORATION			RIPARIAN LANDS			MARGINAL AG. LANDS			PASTURED HILLSIDES			LIVING SNOWFENCE			GRAND TOTALS		
			# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $
4	90	WRIGHT	3	26.1	$14,356	1	34.0	$27,528				1	6.2	$2,654	2	34.0	$11,149				7	100.3	$55,687
5	91	YELLOW MEDICINE				2	157.0	$126,600													2	157.0	$126,600
		TOTALS	20	510.0	$218,683	113	3,705.0	$2,422,319	32	597.9	$434,548	125	2,660.9	$1,650,675	137	4,650.5	$1,555,901	0	0.0	$0	427	12,124.3	$6,282,126
																					427	12,124.3	$6,282,126

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1989
RIM ADMINISTRATIVE PAYMENTS
REVISED 10/16/89

DISTRICT	INDEX	INDEX PAYMENT	BASE PAYMENT	TOTAL PAYMENT
AITKIN	2.50	$1,588	$1,000	$2,588
ANOKA	0.00	$0	$400	$400
BECKER	4.25	$2,700	$1,600	$4,300
BELTRAMI	11.25	$7,146	$1,100	$8,246
BENTON	6.75	$4,288	$2,100	$6,388
BIG STONE	16.25	$10,322	$500	$10,822
BLUE EARTH	3.00	$1,906	$1,500	$3,406
BROWN	17.75	$11,275	$1,200	$12,475
CARLTON	0.00	$0	$300	$300
CARVER	11.50	$7,305	$1,100	$8,405
CASS	1.00	$635	$300	$935
CHIPPEWA	2.75	$1,747	$1,000	$2,747
CHISAGO	4.75	$3,017	$2,600	$5,617
CLAY	13.00	$8,258	$1,800	$10,058
CLEARWATER	6.00	$3,811	$500	$4,311
COOK	0.00	$0	$400	$400
COTTONWOOD	49.75	$31,602	$900	$32,502
CROW WING	0.00	$0	$300	$300
DAKOTA	4.75	$3,017	$1,600	$4,617
DODGE	1.75	$1,112	$600	$1,712
DOUGLAS	44.75	$28,426	$1,500	$29,926
FARIBAULT	30.50	$19,374	$600	$19,974
FILLMORE	12.00	$7,623	$2,500	$10,123
FREEBORN	11.50	$7,305	$2,000	$9,305
GOODHUE	30.50	$19,374	$2,800	$22,174
GRANT	10.25	$6,511	$300	$6,811
HENNEPIN	2.00	$1,270	$300	$1,570
HUBBARD	0.75	$476	$700	$1,176
ISANTI	13.00	$8,258	$4,000	$12,258
ITASCA	4.75	$3,017	$400	$3,417
JACKSON	14.50	$9,211	$1,300	$10,511
KANABEC	1.50	$953	$500	$1,453
KANDIYOHI	28.00	$17,786	$2,400	$20,186
KITTSON	4.50	$2,859	$1,200	$4,059
KOOCHICHING	1.00	$635	$300	$935
LAC QUI PARLE	3.25	$2,064	$800	$2,864
LAKE	0.00	$0	$300	$300
LAKE OF THE WOODS	0.00	$0	$800	$800
LESUEUR	9.25	$5,876	$1,400	$7,276
LINCOLN	12.25	$7,781	$1,000	$8,781
LYON	13.00	$8,258	$800	$9,058
MAHNOMEN	0.00	$0	$600	$600
MARSHALL-BELTRAMI	2.50	$1,588	$700	$2,288
MARSHALL	3.75	$2,382	$1,300	$3,682
MARTIN	15.00	$9,528	$1,300	$10,828
MCLEOD	33.75	$21,439	$1,200	$22,639
MEEKER	19.75	$12,546	$1,800	$14,346
MILLE LACS	15.00	$9,528	$900	$10,428

1989
RIM ADMINISTRATIVE PAYMENTS
REVISED 10/16/89

DISTRICT	INDEX	INDEX PAYMENT	BASE PAYMENT	TOTAL PAYMENT
MORRISON	48.25	$30,650	$2,500	$33,150
MOWER	8.50	$5,399	$600	$5,999
MURRAY	16.75	$10,640	$1,000	$11,640
NICOLLET	3.25	$2,064	$800	$2,864
NOBLES	1.75	$1,112	$600	$1,712
NORMAN	12.75	$8,099	$1,500	$9,599
OLMSTED	5.25	$3,335	$1,300	$4,635
EAST OTTER TAIL	1.00	$635	$2,700	$3,335
WEST OTTER TAIL	5.50	$3,494	$1,700	$5,194
PENNINGTON	1.00	$635	$1,000	$1,635
PINE	0.00	$0	$400	$400
PIPESTONE	7.00	$4,447	$500	$4,947
EAST POLK	3.75	$2,382	$2,600	$4,982
WEST POLK	0.00	$0	$700	$700
POPE	34.00	$21,598	$1,700	$23,298
RAMSEY	0.00	$0	$300	$300
RED LAKE	5.50	$3,494	$600	$4,094
REDWOOD	29.50	$18,739	$1,100	$19,839
RENVILLE	67.00	$42,560	$1,000	$43,560
RICE	16.00	$10,164	$1,900	$12,064
ROCK	2.75	$1,747	$400	$2,147
ROOT RIVER	15.50	$9,846	$1,900	$11,746
ROSEAU	1.50	$953	$1,500	$2,453
NORTH ST. LOUIS	0.00	$0	$400	$400
SOUTH ST. LOUIS	0.00	$0	$400	$400
SCOTT	19.00	$12,069	$2,500	$14,569
SHERBURNE	0.00	$0	$2,600	$2,600
SIBLEY	45.25	$28,744	$1,200	$29,944
STEARNS	3.50	$2,223	$3,400	$5,623
STEELE	5.50	$3,494	$900	$4,394
STEVENS	28.00	$17,786	$700	$18,486
SWIFT	20.50	$13,022	$1,100	$14,122
TODD	2.00	$1,270	$1,400	$2,670
TRAVERSE	1.00	$635	$500	$1,135
WABASHA	37.75	$23,980	$2,000	$25,980
WADENA	13.75	$8,734	$1,300	$10,034
WASECA	4.00	$2,541	$600	$3,141
WASHINGTON	0.00	$0	$500	$500
WATONWAN	1.00	$635	$1,300	$1,935
WILKIN	3.00	$1,906	$800	$2,706
WINONA	10.00	$6,352	$1,800	$8,152
WRIGHT	26.00	$16,516	$2,000	$18,516
YELLOW MEDICINE	8.50	$5,399	$700	$6,099
	1009.25	$641,100	$108,900	$750,000

Minnesota Board of Water & Soil Resources

Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, Minnesota 55107
(612) 296-3767

TO: Wayne Edgerton

FROM: Jeff Nielsen

DATE: October 12, 1989

RE: CURTIS ARNDT
RIM LAND EXCHANGE 17-12-86-1

On October 11, 1989 Brian Dwight, Tabor Hoek and I reviewed the Curtis Arndt RIM acres. We agreed that the proposed 7.4 acre land exchange would be eligible and acceptable. We then met with Mr. Arndt and proposed several options to him. We believe he picked an option that is most favorable to the RIM Program and the State of Minnesota. This is why I'm only submitting one proposal.

PROPOSAL

1. Exchange the 7.4 acres of land for an adjacent area westerly and slightly south of the current enrolled land. This frees up and releases the current 7.4 acres to Mr. Arndt for a gravel pit operation.

2. Convert the remaining area and the new area into a 32.0 acre RIM perpetual easement. This is where the real benefit comes to the State and the resource with minimal additional expense.

   32.0 acres RIM Easement
   - 9.0 acres Originally Donated
   23.0 acres Eligible for Payment

   He already received $523.00 per acre in 1987 for a limited easement. Presently the payment rate for a perpetual easement is $773.25/acre, leaving us a difference of $250.25/acre or a total payment of $5755.75 to Mr. Arndt to re-establish a new 32.0 acre perpetual easement.

3. Administrative costs will be born by the landowner for an abstract update, title insurance if needed, and recording of the easement at the Courthouse.

4. Seeding of the new 7.4 acre area will be done according to the new conservation plan agreement at no cost to the RIM Reserve Program.

If you have any questions, please give me a call.

sms

Regional Offices

Northwest Region
1819 Bemidji Ave.
Bemidji, MN 56601
218-755-3963

Northeast Region
Government Service Center
320 W. 2nd Street
Room 603
Duluth, MN 55802
218-723-4752

West Central Region
611 Iowa Avenue
Staples, MN 56479
218-894-1692

South Central Region
Box 756
New Ulm, MN 56073
507-354-2196

Southeast Region
Friedell Bldg., Room 100
1200 S. Broadway
Rochester, MN 55904
507 285-7458

Southwest Region
Box 111
1400 E. Lyon Street
Marshall, MN 56258
507-537-7260

East Central Region
Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, MN 55107
612-296-3767

An Equal
Opportunity Employer

Cottonwood Co. NOT to scale Springfield G-10

T2094 16-43

PROPERTY BOUNDRY

R.I.M. EASEMENT

① ② ③ ④ FIELD #

RR-1 PRACTICE #

SPECIAL NOTE

FLD # ③ IS INCLUDED IN EASEMENT BUT NO PAYMENT WILL BE RECIEVED. COVER IS ALREADY EST.

— PROPOSED SITE FOR NEW RIM LAND. 7.4 ac.

— Original RIM LAND 7.4 ac.

1 302.0

RR-1 ① 2 8.2 8.2

1 5.2

16-375 T2095

④ 7.4 AC. RR-1

③ 9.0 AC EST.

Field Drive

3 93.5

500'

644'

8-553

T2269

R. 37 W.

94B 595C 41B

130 102B 41A 41B 313 1834 1833 1834 884 595C 41A 595C 313 94B 102B 887B 102B 41B River 41A 31D 41B 1834 887B 595C 94B 247 Mojinas 94B 31E 130 255 313

1 75.1

16-199 T2096

8-563 T2268

8-563

BOARD OF WATER & SOIL RESOURCES
110B COMPREHENSIVE WATER PLANNING
COUNTY STATUS REPORT

October 16, 1989

COUNTY	RESOLUTION TO PLAN (DATE)	INDEPENDENT COUNTY	PART OF REGIONAL PLANNING GROUP	SUBMITTED FOR PRELIMINARY REVIEW (DATE)	SUBMITTED FOR FINAL REVIEW (DATE)	BWSR BOARD ACTION	BWSR PLAN APPROVAL (DATE)	SCHEDULED PLAN UPDATE (DATE)
AITKIN	9/15/87		MH					
BECKER	YES		RRV	8/04/89				
BELTRAMI	10/27/87		MH	6/05/89	8/09/89			
BENTON	10/19/88	X						
BIG STONE								
BLUE EARTH	6/24/86		SC					
BROWN	8/24/87		SC	9/01/89				
CARLTON	12/8/87	X						
CASS	10/9/87		MH	8/23/89				
CHIPPEWA								
CHISAGO								
CLAY	YES		RRV	8/04/89				
CLEARWATER	10/28/87		MH	6/05/89	8/09/89			
COOK								
COTTONWOOD	8/18/87		SC					
CROW WING	11/3/87		MH					
DODGE	12/22/87		RZ	8/21/89				
DOUGLAS	5/24/88	X		8/15/89				
FARIBAULT	6/17/86		SC					
FILLMORE	12/8/87		RZ	8/30/89				
FREEBORN	6/23/86		SC	10/01/89				
GOODHUE	12/15/87		RZ	7/31/89				
GRANT	YES		RRV	8/04/89				
HOUSTON	12/8/87		RZ	9/25/89				
HUBBARD	10/7/87		MH	7/05/89	10/03/89			
ISANTI								
ITASCA	10/27/87		MH					
JACKSON	6/23/86		SC					
KANABEC								
KANDIYOHI								
KITTSON	10/6/87		RRV	8/04/89				
KOOCHICHING								
LAC OUI PARLE								
LAKE								
LAKE OF THE WOODS								
LESUEUR	6/24/86		SC					
LINCOLN	9/15/87		RC					
LYON	10/10/87		RC					
MCLEOD								
MAHNOMEN	10/13/87		RRV	8/04/89				
MARSHALL	10/20/87		RRV	8/04/89				
MARTIN	6/17/86		SC	6/1/89				
MEEKER								
MILLE LACS								

BOARD OF WATER & SOIL RESOURCES
110B COMPREHENSIVE WATER PLANNING
COUNTY STATUS REPORT

October 16, 1989

COUNTY	RESOLUTION TO PLAN (DATE)	INDEPENDENT COUNTY	PART OF REGIONAL PLANNING GROUP	SUBMITTED FOR PRELIMINARY REVIEW (DATE)	SUBMITTED FOR FINAL REVIEW (DATE)	BWSR BOARD ACTION	BWSR PLAN APPROVAL (DATE)	SCHEDULED PLAN UPDATE (DATE)
MORRISON	10/27/87		MH					
MOWER	12/15/87		RZ	8/04/89				
MURRAY	10/10/87		RC					
NICOLLET	7/15/86		SC					
NOBLES	YES	X		9/20/89				
NORMAN	YES		RRV	8/04/89				
OLMSTEAD	YES		RZ	8/07/89				
OTTER TAIL	YES		RRV	8/04/89				
PENNINGTON	YES		RRV	8/04/89				
PINE								
PIPESTONE	10/10/87		RC					
POLK	YES		RRV	8/04/89				
POPE								
RED LAKE	YES		RRV	8/04/89				
REDWOOD	10/10/87		RC					
RENVILLE								
RICE	12/8/87		RZ	8/23/89				
ROCK	7/01/89	X						
ROSEAU	YES		RRV	8/04/89				
ST. LOUIS								
SHERBURNE								
SIBLEY	6/24/86		SC					
STEARNS	2/3/88	X						
STEELE	6/24/86		SC	8/24/89				
STEVENS	YES		RRV	8/04/89				
SWIFT								
TODD	9/18/89	X						
TRAVERSE	YES		RRV	8/04/89				
WABASHA	12/22/87		RZ	8/27/89				
WADENA								
WASECA	7/1/86		SC	10/01/89				
WATONWAN	6/24/86		SC	4/89	8/01/89			
WILKIN	YES		RRV	8/04/89				
WINONA	2/23/88		RZ	9/06/89				
WRIGHT	6/20/89	X						
YELLOW MEDICINE	10/10/87		RC					
TOTALS								
81	59	8	51	36	4	0		

RRV - Red River Valley 15 Co. Joint Powers Board
MH - Mississippi Headwaters Board, 8 Counties
RC - Redwood-Cottonwood Rivers Control Area, 6 Counties
SC - South Central Watershed Planning Project, 13 Counties
RZ - Root-Zumbro Rivers Watershed, 9 County Joint Powers Board

X - Independent Conties, Counties preparing plans alone

BOARD OF WATER AND SOIL RESOURCES
GOLDEN STEER
SOUTH ST. PAUL, MINNESOTA
OCTOBER 25, 1989

AGENDA

9:00 a.m.	1. Call to Order
	2. Adopt Agenda
	3. Approval of Minutes of September 27, 1989
	4. Reports - Chairman's Report -- Donald Ogaard - Executive Director's Report -- Jim Birkholz - EQB/Water Resources Committee Report -- Loni Kemp - BWSR Award Program Nominee -- Loni Kemp - First Quarter Budget Report -- Tom Schwanke - Expense Report Update -- Tom Schwanke - Assessment of tax bill impact on BWSR programs -- Greg Larson - Tabled item from 9/27/89 meeting -- Clay SWCD cost-share request
10:00 a.m.	5. Wellhead Protection Video -- Bruce Olson, Minnesota Department of Health
10:30 a.m.	6. East Central Administrative Region Report -- Mark Nelson
11:00 a.m.	7. 110B Comprehensive Local Water Plans -- Doug Thomas - Plans for approval: Watonwan, Beltrami, Clearwater Local representatives from each county have been invited plus Rep. Phyllis Kahn, Rep. Virgil Johnson, and John Velin, LCMR, and John Wells and Marilyn Lundberg, SPA - Plan Overview: Hubbard County -- Dan Steward and Bill Alden, Hubbard SWCD - Status Report
	8. Advisors' Comments
Noon	Lunch
1:00 p.m.	9. RIM Reserve Program -- Wayne Edgerton - Sign-up results -- for information - Allocation of service grants to SWCDs -- for decision - Proposed Curtis Arndt, Cottonwood County, RIM land exchange -- for decision
2:00 p.m.	10. Metropolitan Water Planning -- Bruce Sandstrom - Plan Overviews: Rice Creek WMO and West Mississippi WMO - Status Report - No plan approvals
2:30 p.m.	11. Minnesota Forestry Improvement Program allocations - for decision -- Greg Larson
3:00 p.m.	Adjourn

MEMORANDUM OF UNDERSTANDING

Between

Minnesota Department of Agriculture

and the

Board of Water and Soil Resources

PURPOSE: to effectuate an orderly transition of the accounting functions of the Board of Water and Soil Resources (BWSR) from the Department of Agriculture (MDA) to the Board.

GOALS: To assure that accounting functions are properly performed according to set standards and timelines. To assure that staff professionalism is maintained and mutual respect is shown for all employees concerned.

POINTS OF AGREEMENT:

1. MDA Personnel and Office Management Division will continue to provide support services to BWSR until such time as BWSR has the expertise and staff to perform these functions. BWSR employees will assist MDA employees on personnel matters, employee benefit administration and office management matters wherever and whenever possible.

2. MDA Accounting Division will assist the BWSR in the transition. Specific activities include:

Payroll

The BWSR will assume total responsibility for their payroll processing effective November 21, 1989. The MDA payroll personnel will assist the BWSR in processing the November 7, 1989 payroll in the Board office as a final training prior to assuming total responsibility the following pay period.

Routine Accounting Functions
(procurement, payment, filing and auditing)

The BWSR will assume responsibility for routine accounting functions effective with purchases dated October 13, 1989. Assistance from appropriate MDA accounting staff will be provided on an as-needed basis. The MDA staff will provide:

a. on-site assistance in the BWSR office for setting up files and records and processing new transactions;
b. phone consultations on specific problems with transactions;
c. MDA staff will clear up the backlog of pending accounting transactions in the BWSR office with the support and assistance of BWSR staff.

Budgetary & Financial Analysis
(annual & biennial budget preparation and maintenance,
Dept. of Finance requirements & requests,
financial report distribution & analysis)

The BWSR will assume responsibility for these functions effective October 13, 1989. Phone consultation with MDA staff may be necessary in the future. In order to fully assume these responsibilities, all FY89 records (payment files, contract files, etc.) should be transferred physically to the BWSR offices by the end of the month.

Inventory Control & Planning Division Services

MDA will continue to provide Inventory Control services and Planning Division assistance until such time as BWSR has the expertise and staff to solely perform these functions. Telephone consultation with MDA staff may be necessary. MDA will provide training and assistance for BWSR staff when this responsibility is transferred.

3. Other Points:

MDA will physically transfer to the BWSR the lateral 5-drawer, brown file cabinet and contents (RIM and BWSR grant files). This file will be moved to BWSR office by MDA staff on Friday, October 13, 1989.

The Board may continue to use the MDA conference rooms with no charge. (through this fiscal year)

The Board may use Word Processing Center services (typing, copying, folding, binding, laminating, etc.) on a cost-reimbursement basis.

MDA will establish a standard location for the collection of RIM-related documents (still under Ag's 04 account).

MDA agrees to actively support BWSR's legislative initiative to acquire an additional staff person and support funding in the next legislative session.

By acceptance of this Memorandum of Understanding, MDA and BWSR have taken steps to realize the agreed-upon goals of BWSR independence and reduction of MDA workload concerns. We will work together to resolve any issues not addressed in this MOU.

I hereby agree to the aforementioned:

Jim Nichols	Patricia Bloomgren	Jim King
Commissioner, MDA	Asst. Dir. BWSR	Dept. of Finance

BWSR CONSERVATION INFORMATION AWARD NOMINATION

Nominator: Loni Kemp

Name: Agri News
William C. Boyne, Publisher
Kelly J. Boldan, Editor

Address: 18 1st Avenue SE
P.O. Box 6118
Rochester, MN 55903

Why Agri News deserves this award:

The Agri News is a weekly agriculture newspaper distributed to 17,000 farmers and others in southern Minnesota and northern Iowa. Over a period of many years, they have consistently covered soil and water issues as well as sustainable agriculture to an extent I've not seen in any other general agriculture publication.

The Agri News carries wire service articles and important columns on resource issues from other publications around the nation . In addition, they do their own indepth coverage of state and local conservation events, programs, groups, and issues. They consistently take editorial stances in favor of policies that protect water and soil and promote sustainable agriculture. Every issue carries numerous articles informing people of resource policy issues, whether they arise from government, university researchers, business, or private organizations. They have played a major education and opinion-shaping role in southern Minnesota and northern Iowa. In particular, they have covered groundwater contamination, agricultural chemicals, soil erosion, and the growing movement towards sustainable agriculture.

Most important is the fact that these issues are covered broadly, in depth, and repeatedly, so that readers over time become well informed about a diversity of conservation issues and how they interrelate.

OB FINR5801,DRVSORT
ROGRAM FINR5821
C-REQ=118,RPT=6

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* STATEWIDE ACCOUNTING SYSTEM * PAGE NO. 1
* MANAGERS FINANCIAL REPORT * REPORT DATE 09/30/89
* DEPT 99 MISC.BOARDS & COMM FISCAL YEAR 0 *
* PAID THRU 0930; PRIOR YEAR PAYROLL THRU 091388, CURRENT YEAR THRU 091289 *
****

REPORT INCLUDES : ALL ENCUMBRANCES
DEPT 99 DIV 780 THRU DEPT 99 DIV 780
FUND 01 THRU FUND 98 - OBJ 000 THRU OBJ 998

EPORT IS SORTED/SUBTOTALED BY:
EPT OBJ1 OBJ2

		AMOUNT PAID PRIOR Y.T.D.	BUDGET	AMOUNT PAID CURRENT Y.T.D.	OBLIGATIONS	BALANCE
0	PERSONAL SERVICES					
01	REGULAR CLASSIFIED	113,459	996,212	160,651	643,299	192,262
02	REGULAR UNCLASSIFIED	20,745	157,009	28,439	129,536	966-
03	PART-TIME/SEASONAL/ETC	1,519	21,000	7,852	39,428	26,280-
04	SEVERANCE/VAC PAYOFF/RELOC	4,504	5,788	6,072	0	284-
07	OVERTIME PAY	78	0	0	0	0
08	MISCELLANEOUS PAYROLL	840	30,000	2,486	27,514	0
09	MISC EMPLOYEE BENEFITS	0	18,000	194	6	17,800
OTAL -	0	141,145	1,228,009	205,695	839,783	182,531
1	EXPENSES/CONTRACTUAL SRVCS					
10	RENT	36,995	363,000	12,821	241,404	108,775
11	ADVERTISING	41	11,000	545	4,555	5,900
12	REPAIRS/ALTERATIONS/MAINT	130	7,872	1,186	8,591	1,905-
14	PRINTING & BINDING	2,029	63,992	3,718	41,962	18,312
15	CONSULTANT SERVICES	0	213,500	0	0	213,500
16	PROFESSIONAL/TECHNICAL SRVC	22	72,400	444	25,756	46,200
17	DATA PROCESS & SYSTEMS SRVC	0	5,000	111	5,489	600-
18	PURCHASED SERVICES	3,138	11,454	4,166	8,834	1,546-
OTAL -	1	42,354	748,218	22,991	336,591	388,636
2	MISC OPERATING EXPENSES					
20	COMMUNICATIONS	5,964	41,500	6,227	35,252	21
21	TRAVEL & SUBSIST, IN-STATE	9,792	122,404	15,608	99,892	6,904
22	TRAVEL & SUBSIST, OUT-OF-MN	2,097	10,000	5,228	3,186	1,586
29	FEES & OTHER FIXED CHARGES	637	28,900	85	46,316	17,501-
OTAL -	2	18,489	202,804	27,147	184,646	8,989-
3	SUPPLIES/MATERIALS/PARTS					
30	SUPPLIES/MATERIALS/PARTS	2,999	42,694	5,305	24,643	12,746
OTAL -	3	2,999	42,694	5,305	24,643	12,746
4	CAPITAL EQUIPMENT-$500 & UP					
40	CAPITAL EQUIPMENT-$500 & UP	0	16,393	0	1,589	14,804
OTAL -	4	0	16,393	0	1,589	14,804
5	REAL PROPERTY					
50	LAND & INTEREST IN LAND	0	5,099,848	3,351	542,086	4,554,411
OTAL -	5	0	5,099,848	3,351	542,086	4,554,411

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* S T A T E W I D E A C C O U N T I N G S Y S T E M *

* M A N A G E R S F I N A N C I A L R E P O R T *

* DEPT 99 MISC.BOARDS & COMM FISCAL YEAR 0 *

* PAID THRU 0930; PRIOR YEAR PAYROLL THRU 091388, CURRENT YEAR THRU 091289 *

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REPORT INCLUDES : ALL ENCUMBRANCES

REPORT IS SORTED/SUBTOTALED BY:
DEPT OBJ1 OBJ2

DEPT 99 DIV 780 THRU DEPT 99 DIV 780
FUND 01 THRU FUND 98 - OBJ 000 THRU OBJ 998

		AMOUNT PAID PRIOR Y.T.D.	BUDGET	AMOUNT PAID CURRENT Y.T.D.	OBLIGATIONS	BALANCE
7	GRANTS & AIDS					
77	AID TO LOCAL SPEC DISTRICTS	2,269,694	4,336,231	2,382,611	323,815	1,629,805
TOTAL - 7		2,269,694	4,336,231	2,382,611	323,815	1,629,805
TOTAL - DEPT 99		2,474,682	11,674,197	2,647,100	2,253,152	6,773,945

SELLIN BROTHERS, INC.

TELEPHONE (218) 483-3522

HIGHWAY AND
UNDERGROUND CONSTRUCTION

Hawley, Minnesota 56549

HAROLD SELLIN, Chairman
Telephone 483-4798

MARK SELLIN, Vice President
Telephone 483-4155

CARL SAHLBERG, President
Telephone 483-3269

LYLE HANSEN, Superintendent
Telephone 483-4432

September 1, 1989

John Cousins, Engineer
Clay County Highway Department
1300 15th Ave. North
Mhd., Mn. 56560

Re: MN-02-12-01-83
Clay County Ditch #35
Moorhead, Minnesota

Dear Jack:

Due to unforeseen circumstances, Sellin Brothers is requesting that changes to made to the above contract.

A time extension of one month and adequate compensation to repair Ditch #35 should be considered. The excessive amounts of rainfall of 8-30-89 and 8-31-89 have made working conditions impossible. Check bales were placed on 8-23-89 but were washed out by the rain. An effort was made to install additional check bales on 9-1-89 to prevent further washing but the amount of water was too great.

This rainfall has done a considerable amount of damage. The contractor should be compensated for an 'ACT OF GOD' of this magnitude in order to repair the ditch. A time extension to October 15th is also a necessity.

Raymond International, a subcontractor, has filed Chapter 11 and will not be able to install the erosion control mat. The Prepakt Concrete Co. has been chosen to install the mat. An increase in unit price was the result in this change of subcontractors.

Raymond quoted us $3.12 per S.F. to install the mat. Sellin Brothers added $0.38 per S.F. to cover expenses and profit. .Therefore, the original amount for bid item no. 4 was $3.50 per S.F.

Prepakt quoted us $3.62 per S.F. to install the mat. This quote is to include the amount of geotextile fabric needed to cover the entire mat. According to the plans and specifications the amount of geotextile fabric was not clearly defined. Sellin Brothers added $0.38 per S.F. to cover expenses and profit. Therefore, the requested amount for bid item no. 4 will be $4.00 per S.F.

In summary Sellin Brothers, Inc., request the following:

1. An October 15, 1989, completion date.
2. Adequate compensation for ditch repair.
3. $4.00/SF for bid item no. 4.

Respectfully yours,

Mark Sellin, Vice President

MRS/kl

cc: Al Broyles, 413 West Stanton Ave., Fergus Falls, Mn. 56537

WELLHEAD PROTECTION FOR MINNESOTA

What is it?-Wellhead protection is a means for safeguarding public goundwater supplies by preventing contaminants from entering the area that contributes water to a well or well field during a time period such as ten years. A wellhead protection area is defined using geologic and hydrologic criteria; such as the physical characteristics of the aquifer and the effects a pumping well has on the rates and directions of groundwater movement. A management plan is developed for the wellhead protection area that includes inventorying potential sources of groundwater contamination, monitoring for the presence of specific contaminants, and implementing controls over existing and proposed land- and water- uses that pose a threat to groundwater quality.

What laws require wellhead protection?-The Minnesota Groundwater Protection Act of 1989 mandates that the Commissioner of Health develop wellhead protection measures for wells serving public water supplies. Also, the 1986 Amendments to the Federal Safe Drinking Water Act require states to implement wellhead protection programs for public water wells.

Who administers wellhead protection?-The Minnesota Department of Health is the lead agency for administering Minnesota's wellhead protection program. However, wellhead protection will be effective only through the cooperation of state and local govenments, public water purveyors, and the general public. Much of the responsibliity for carrying out a wellhead protection management plan will rest with the public water purveyor and local units of government.

Will wellhead protection be required for all public supply wells?-The long-term goal is to implement wellhead protection measures for all public water wells. However, the large number of public supply wells (17,000), the diversity of geologic conditions in Minnesota, and the limited resources currently available to MDH require that wellhead protection be implemented in phases. MDH will implement wellhead protection in late 1991 or early 1992 beginning with new municipal wells. Existing municipal wells and other types of public supply wells will be phased in later.

How will State wellhead protection rules be developed?-The Minnesota Department of Health (MDH) is establishing two advisory committees to assist with rule development. A technical advisory committee will recommend hydrogeologic criteria and methods for delineating wellhead protection areas. A policy advisory committee will recommend procedures for implementing wellhead protection and coordinating it with the State's other groundwater protection programs. The opportunity for public involvement in rule development and program implementation is mandated by State and Federal law.

For further information concerning wellhead protection please contact:

Bruce Olsen (612)623-5297 or Tomas Klaseus (612)623-5621

Minnesota Department of Health
Section Of Water Supply and Well Management
Special Services Unit
717 S.E. Deleware St.
Minneapolis, Mn. 55440

OVERVIEW OF THE HUBBARD COUNTY WATER PLAN
FOR THE OCTOBER 25, 1989 BOARD MEETING

INTRODUCTION

On October 7, 1987, the Hubbard County Board authorized development of a comprehensive local water plan. The Hubbard SWCD was selected to guide development of the plan. Bill Alden, SWCD manager, served as project manager. A 19 member task force was appointed, and the consulting firm, Klaers, Powers, & Associates, was hired to help write the plan. Hubbard County is a member of the eight county Mississippi Headwaters Board Joint Powers Agreement (MHB). Molly MacGregor provided regional coordination of local water plan development for the MHB member counties. From January 1988 to July 1989, the task force or its subcommittees met 21 times to review data, discuss issues, identify goals and develop the management plan.

COUNTY DESCRIPTION

Hubbard County is located in north-central Minnesota, approximately 150 miles northwest of the Twin Cities. Park Rapids is the county seat. All of Hubbard County drains into the Mississippi River. 1987 population was estimated at 15,600. The county has experienced nearly 50% population growth since 1970. Strong growth is expected to continue, with much of the growth occurring in shoreland areas. Agricultural land uses occupy 14% of the county's 932 square miles. The county's 313 lakes occupy 7% of its area. About 40% of the county is in public ownership. 31% of the county's 1987 tax base was classified seasonal recreational while agricultural and timber classifications combined for 7%.

STAFF REVIEW

The Hubbard County Task Force has developed a very strong comprehensive local water plan. The County Environmental Services Department (ESD) will be responsible for directing implementation of the plan. The county will hire 2 new ESD employees to coordinate plan implementation.

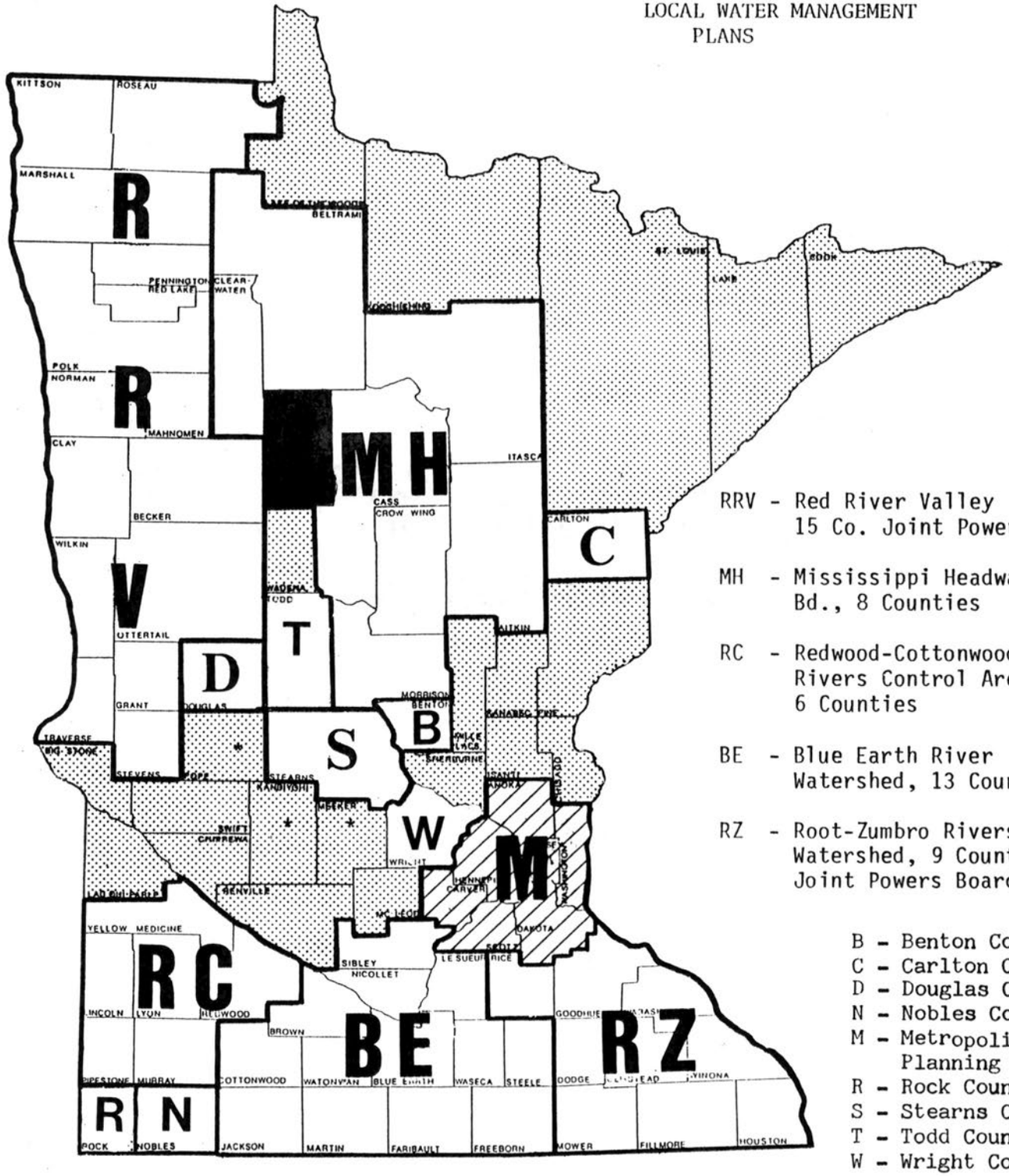
One of the key issues raised in the plan regards economic growth and its impact on water quality. On page 38 the Plan states: "The quality of Hubbard County's surface waters is the major water resource issue at this time. Overdevelopment of lakeshore property, inadequate septic systems, and improper land use practices within lake watersheds are seen as the primary contributory factors to perceived deterioration of water quality. Although surface water quality information is lacking in scope and detail, there is general agreement within the county that water quality will continue to worsen if preventative and corrective measures are not taken.

A good portion of the county's future growth depends on tourism and recreational development which hinge on water quality. The County recognizes that it is vital that this development, which if improperly undertaken will threaten the very resource it depends upon, be implemented with rigorous application of appropriate land use and site design standards."

The implementation section of the plan proposes to deal with the growth issue through several actions including preparation of a comprehensive development plan and adoption of a county-wide zoning ordinance. (Strategy 1.A, page 66).

BWSR staff will be working with the project manager and the task force to see that the issues raised in preliminary review are addressed in the plan. No review problems are anticipated.

COUNTIES CURRENTLY DEVELOPING
LOCAL WATER MANAGEMENT
PLANS



RRV - Red River Valley
15 Co. Joint Powers Bd.

MH - Mississippi Headwaters
Bd., 8 Counties

RC - Redwood-Cottonwood
Rivers Control Area
6 Counties

BE - Blue Earth River
Watershed, 13 Counties

RZ - Root-Zumbro Rivers
Watershed, 9 County
Joint Powers Board

B - Benton County
C - Carlton County
D - Douglas County
N - Nobles County
M - Metropolitan Area
Planning Under 509
R - Rock County
S - Stearns County
T - Todd County
W - Wright County

■ - Hubbard County

MINNESOTA BOARD OF WATER & SOIL RESOURCES

East Central Region Board Representative Report
BWSR Meeting
October 25, 1989

The East Central Region is diverse in landforms, ranging from till prairie to sand plain forests. The resource needs are diverse also and with most of the state's population living here, we need strong resource programs to influence and encourage the State and local policy makers living here.

Below are some of the activities that I am involved with and which are important in this region:

a) Water Planning--Stearns, Benton, and Wright are formally involved in the 110B planning effort. Of course virtually all metro lands are currently involved in surface water planning under 509. Dakota, Hennepin, Ramsey, Anoka, and Washington Counties are very active in County Groundwater Planning.

b) Intergovernmental Cooperative Efforts--

Hennepin - In an effort to pull the WMOs together, a policy committee was created with representation from each WMO. The first product this joint effort created is an "Erosion and Sediment Control Manual". The new focus of this group is water quality and again all WMOs (both WDs and JPC) are represented.

Ramsey - Pilot legislation was passed for the SWCD to implement uniform erosion and sediment control criteria. WMOs will need to amend their plans to conform with this program.

I feel our BWSR Erosion and Sediment Control Planning Handbook compliments these other handbook efforts. It has been distributed to all counties, WDs, SWCDs, and other agencies.

c) Working with clientele--

Association of Metropolitan SWCDs: Urban Update newsletter.
Anoka Sand Plain SWCDs: Groundwater Planning
Watershed Districts: I have visited 3 WDs to formally offer BWSR assistance. Still a developing relationship with field staff.

d) Metropolitan Local Water Management Task Force--Goal is to improve water management in the Twin Cities. Metropolitan SWCDs have resolved "to do whatever the task force wants them to do to accomplish 509 goals."

Another issue surfacing in the metropolitan area is wetlands preservation. SWCDs and WDs have been involved with this issue in the past and should be recognized as leaders.

e) Feedlot Task Force--The dairy belt of Minnesota has some urgent needs which this task force is going to address. Currently Stearns County has 1800 feedlots, 600 are estimated to be critical polluters. The SWCD has around 50 requests for design assistance for feedlots which translates to 2.5 staff years (10-14 days per feedlot). A real workforce demand.

f) I am also the training team chairman. Some of the upcoming events planned are as follows:

Nov. 1 & 2:	New Employee Orientation
Dec. and Jan.:	Accounting Close-out Sessions
Feb. 14 & 15:	Manager - Chairman Session for SWCDs and WDs

Needs from the Board in addressing the above issues:

a) Assist outstate counties in building the technical capability to implement county water plans. This may include a high priority for the aforementioned from our implementations grants.

b) Support local intergovernmental efforts through policy motions.

c) Challenge our clientele to work together through policy motions joint meetings, etc.

d) Support our clientele to be more effective in the Metropolitan area within the recommendations of the task force. New initiatives should recognize the past efforts of our clientele.

e) Continue supporting the feedlot task force and the eventual recommendations. We need to pry some more dollars from somewhere.

f) Verbally support our training efforts. Also, any suggestion for training session topics are always welcome!

SCS/SWCDs MARKET "CONSERVATION ON YOUR OWN"

by

Michael M. Price
Public Affairs Specialist
U.S. Department of Agriculture
Soil Conservation Service
600 FCS Bldg.
375 Jackson Street
St. Paul, MN 55101-1854
(612) 290-3677

The conservation compliance provision in the Food Security Act of 1985 required farmers particating in USDA programs and who produce an annual commodity crop on highly erodible land to develop a conservation plan for that land by January 1, 1990. The Act further requires that the applied soil and water conservation practices in those conservation plans reduce soil erosion to tolerable levels, and be fully implemented by January 1, 1995. The U. S. Department of Agriculture, Soil Conservation Service(SCS) and the 91 Soil and Water Conservation Districts(SWCDs) in Minnesota are helping Minnesota's farmers develop and approve their conservation plans, and apply the conservation work.

To help farmers apply their conservation practices, the SCS, in cooperation with SWCDs, have developed and implemented a How-to "Conservation On Your Own" campaign.

The heart of the campaign is a ½-inch VHS video tape containing the steps that show and tell a farmer how to apply eight different conservation practices. They're titled: How to measure and manage their crop residues; How to lay out contour lines and farm on the contour (and make use of field borders); How to lay out contour buffer strips; Points to consider in contour stripcropping; How to lay out wind strips; How to control small gullies with grass; How to plant and maintain field windbreaks; and, How to maintain terraces.

(more)

The idea of the self-help video is to give the farmer the best guidance conservation experts can provide. Farmer use of this video will allow them to apply several of the simpler agronomic practices on their own.

The SCS in Minnesota has distributed 1,200 copies of the video tape among SCS/SWCD county offices, other USDA agencies, regional offices of the Minnesota Department of Natural Resources, Minnesota Pollution Control Agency, Board of Water and Soil Resources, Farm Bureau, Farm Credit Services, selected banks and other financial institutions, and at other county-locations where farmers conduct their agri-business.

In all cases, SCS is encouraging farmers to first discuss their conservation plan with SCS/SWCD conservationists and then borrow the tape from any of the agencies/organizations mentioned above. The tape is available on a free 24 to 48-hour loan period.

Other How-to "Conservation On Your Own" campaign components include a logo, a free color brochure, news releases, radio public service announcements, articles for organization/group newsletters, column closers and fact sheets.

For more information, contact the SCS/SWCD office located in your county, any of the above mentioned organizations or groups, or call the SCS State Office Public Affairs Office in St. Paul at (612) 290-3677.

# # #

RIM RESERVE 89-1 PRELIMINARY SIGNUP SUMMARY

BOARD OF WATER AND SOIL RESOURCES

ADMINISTRATIVE REGIONS

NORTHWEST REGION			
TYPE	# EASE	# ACRES	$ TOTAL
SEN GD WA	1	31.4	$5,488
WET REST	1	51.5	$16,000
RIPARIAN	2	15.4	$6,118
MARG AG.	8	194.9	$58,825
PAST HILL	0	0.0	$0
LIV SNO	0	0.0	$0
TOTAL	12	293.2	$86,431

NORTHEAST REGION			
TYPE	# EASE	# ACRES	$ TOTAL
SEN GD WA	0	0.0	$0
WET REST	10	124.6	$61,316
RIPARIAN	0	0.0	$0
MARG AG.	6	147.8	$48,689
PAST HILL	0	0.0	$0
LIV SNO	0	0.0	$0
TOTAL	16	272.4	$110,005

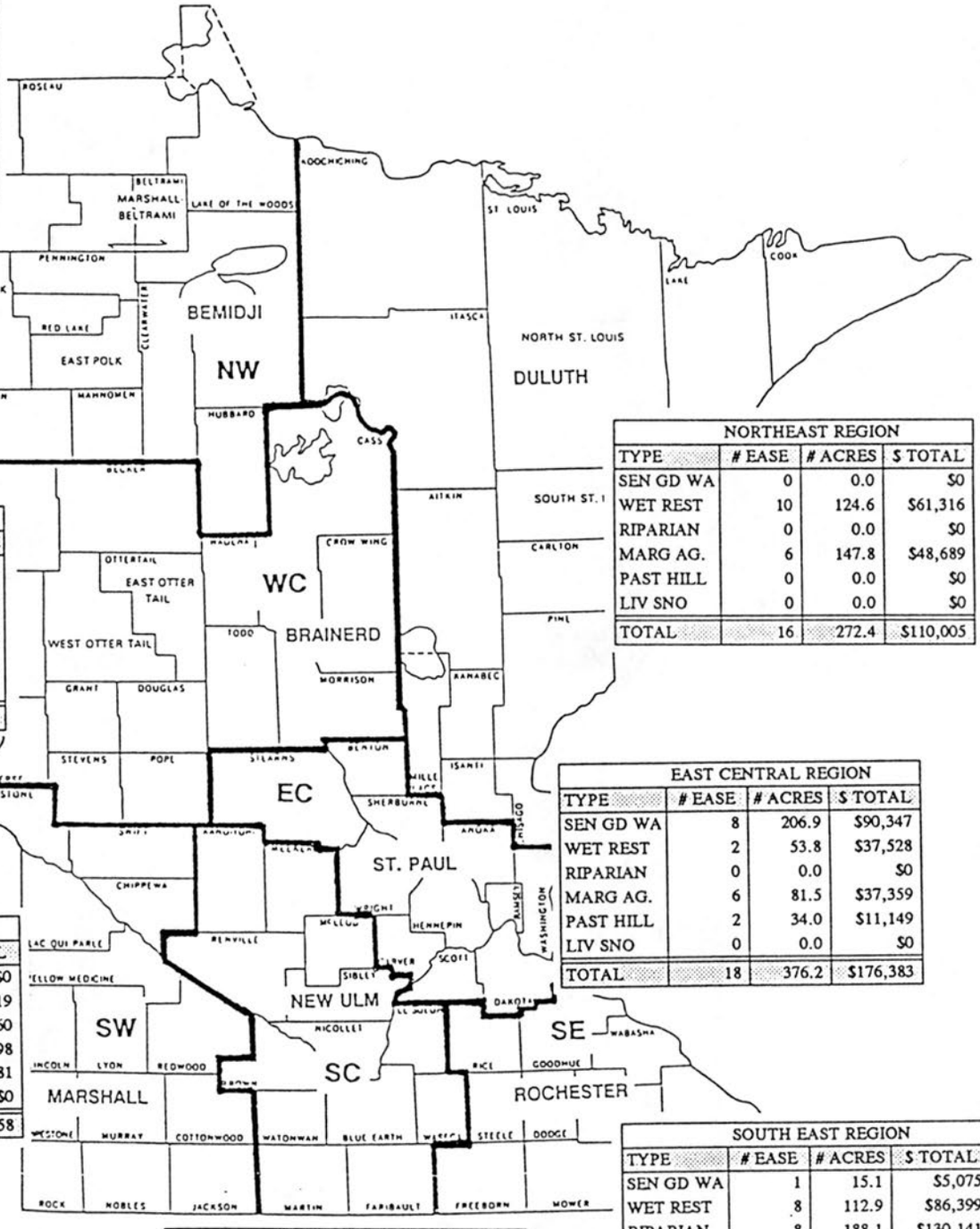
WEST CENTRAL REGION			
TYPE	# EASE	# ACRES	$ TOTAL
SEN GD WA	8	180.9	$56,934
WET REST	41	1697.5	$896,778
RIPARIAN	4	53.6	$40,466
MARG AG.	28	853.6	$376,720
PAST HILL	13	455.3	$139,649
LIV SNO	0	0.0	$0
TOTAL	94	3,240.9	$1,510,547

EAST CENTRAL REGION			
TYPE	# EASE	# ACRES	$ TOTAL
SEN GD WA	8	206.9	$90,347
WET REST	2	53.8	$37,528
RIPARIAN	0	0.0	$0
MARG AG.	6	81.5	$37,359
PAST HILL	2	34.0	$11,149
LIV SNO	0	0.0	$0
TOTAL	18	376.2	$176,383

SOUTH WEST REGION			
TYPE	# EASE	# ACRES	$ TOTAL
SEN GD WA	0	0.0	$0
WET REST	20	679.5	$507,319
RIPARIAN	5	73.4	$51,060
MARG AG.	29	655.5	$518,498
PAST HILL	35	1,058.8	$430,381
LIV SNO	0	0.0	$0
TOTAL	89	2,467.2	$1,507,258

SOUTH CENTRAL REGION			
TYPE	# EASE	# ACRES	$ TOTAL
SEN GD WA	2	75.7	$60,839
WET REST	31	985.2	$816,979
RIPARIAN	13	267.4	$206,763
MARG AG.	26	480.8	$456,690
PAST HILL	3	58.3	$23,088
LIV SNO	0	0.0	$0
TOTAL	75	1,867.4	$1,564,359

SOUTH EAST REGION			
TYPE	# EASE	# ACRES	$ TOTAL
SEN GD WA	1	15.1	$5,075
WET REST	8	112.9	$86,399
RIPARIAN	8	188.1	$130,141
MARG AG.	22	246.8	$153,894
PAST HILL	84	3,044.1	$951,634
LIV SNO	0	0.0	$0
TOTAL	123	3,607.0	$1,327,143



1989 RIM RESERVE PRELIMINARY SIGNUP INFORMATION
REVISED 10/16/89

area	um	DISTRICT	SENSITIVE GRD. WATER			WETLAND RESTORATION			RIPARIAN LANDS			MARGINAL AG. LANDS			PASTURED HILLSIDES			LIVING SNOWFENCE			GRAND TOTALS		
			# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $
3	1	AITKIN																			0	0.0	$0
4	2	ANOKA																			0	0.0	$0
2	3	BECKER	1	40.0	$10,654	1	14.6	$6,447													2	54.6	$17,101
1	4	BELTRAMI	1	31.4	$5,488							2	28.1	$4,897							3	59.5	$10,385
4	5	BENTON	4	147.0	$66,588							1	43.0	$17,459							5	190.0	$84,047
5	6	BIG STONE				3	98.1	$58,741							5	333.9	$103,977				8	432.0	$162,718
6	7	BLUE EARTH																			0	0.0	$0
6	8	BROWN							3	118.4	$92,018										3	118.4	$92,018
3	9	CARLTON																			0	0.0	$0
4	10	CARVER																			0	0.0	$0
2	11	CASS																			0	0.0	$0
5	12	CHIPPEWA				2	134.0	$145,004				1	8.0	$5,719							3	142.0	$150,723
3	13	CHISAGO				1	25.0	$15,247				1	5.0	$4,051							2	30.0	$19,298
2	14	CLAY										4	258.4	$132,425							4	258.4	$132,425
1	15	CLEARWATER																			0	0.0	$0
3	16	COOK																			0	0.0	$0
5	17	COTTONWOOD				3	83.5	$43,333	1	5.4	$5,030	12	165.6	$175,465	19	367.0	$198,439				35	621.5	$422,267
2	18	CROW WING																			0	0.0	$0
4	19	DAKOTA										1	2.0	$1,400							1	2.0	$1,400
7	20	DODGE				1	7.6	$6,499	1	15.2	$9,217										2	22.8	$15,716
2	21	DOUGLAS				15	393.7	$118,233				13	404.2	$147,127							28	797.9	$265,360
6	22	FARIBAULT	2	75.7	$60,839	6	165.6	$162,115				4	72.5	$66,799							12	313.8	$289,753
7	23	FILLMORE	1	15.1	$5,075										11	420.2	$119,928				12	435.3	$125,003
7	24	FREEBORN				1	10.0	$10,846													1	10.0	$10,846
7	25	GOODHUE							1	5.0	$4,133	5	44.8	$24,374	12	215.4	$80,719				18	265.2	$109,226
2	26	GRANT				1	38.0	$33,011													1	38.0	$33,011
4	27	HENNEPIN																			0	0.0	$0
1	28	HUBBARD										1	17.0	$1,528							1	17.0	$1,528
3	29	ISANTI				7	43.0	$22,754													7	43.0	$22,754
3	30	ITASCA										1	55.0	$9,888							1	55.0	$9,888
5	31	JACKSON				2	19.8	$19,972				1	19.2	$9,657	3	95.0	$48,821				6	134.0	$78,450
3	32	KANABEC																			0	0.0	$0
6	33	KANDIYOHI				8	216.0	$161,645													8	216.0	$161,645
1	34	KITTSON																			0	0.0	$0
3	35	KOOCHICHING																			0	0.0	$0
5	36	LAC QUI PARLE				1	24.2	$12,219				1	5.0	$2,448							2	29.2	$14,667
3	37	LAKE																			0	0.0	$0
1	38	LAKE OF THE WOODS																			0	0.0	$0
6	39	LESUEUR										1	9.7	$5,616							1	9.7	$5,616
5	40	LINCOLN				2	48.2	$32,266							2	103.1	$17,458				4	151.3	$49,724
5	41	LYON										1	13.0	$6,033	3	70.4	$16,689				4	83.4	$22,722
1	42	MAHNOMEN																			0	0.0	$0
1	43	MARSHALL-BELTRAMI																			0	0.0	$0
1	44	MARSHALL										1	20.0	$4,071							1	20.0	$4,071

1989 RIM RESERVE PRELIMINARY SIGNUP INFORMATION
REVISED 10/16/89

area	um	DISTRICT	SENSITIVE GRD. WATER			WETLAND RESTORATION			RIPARIAN LANDS			MARGINAL AG. LANDS			PASTURED HILLSIDES			LIVING SNOWFENCE			GRAND TOTALS		
			# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $
6	45	MARTIN				2	109.9	$70,137	2	28.8	$26,351										4	138.7	$96,488
6	46	MCLEOD				2	55.1	$50,056	1	21.6	$19,079	4	58.3	$49,850							7	135.0	$118,985
6	47	MEEKER				4	176.0	$128,831	2	24.5	$16,143	1	3.1	$2,701							7	203.6	$147,675
3	48	MILLE LACS				2	56.6	$23,315				4	87.8	$34,750							6	144.4	$58,065
2	49	MORRISON	2	54.5	$27,257	8	305.0	$168,343				5	75.9	$22,154	5	121.5	$24,950				20	556.9	$242,704
7	50	MOWER							3	100.0	$90,000	3	56.6	$40,000							6	156.6	$130,000
5	51	MURRAY				1	21.5	$18,435				1	27.4	$14,833	2	74.0	$38,157				4	122.9	$71,425
6	52	NICOLLET										1	4.6	$3,337							1	4.6	$3,337
5	53	NOBLES																			0	0.0	$0
1	54	NORMAN							1	10.2	$4,418	2	69.8	$28,574							3	80.0	$32,992
7	55	OLMSTED										1	5.0	$4,455	4	122.4	$39,293				5	127.4	$43,748
2	56	EAST OTTER TAIL																			0	0.0	$0
2	57	WEST OTTER TAIL																			0	0.0	$0
1	58	PENNINGTON																			0	0.0	$0
3	59	PINE																			0	0.0	$0
5	60	PIPESTONE										1	12.1	$7,014	1	15.4	$6,840				2	27.5	$13,854
1	61	EAST POLK										1	30.0	$11,145							1	30.0	$11,145
1	62	WEST POLK																			0	0.0	$0
2	63	POPE				15	866.2	$510,744	1	5.6	$3,059	3	37.0	$17,631	4	202.0	$50,876				23	1110.8	$582,310
4	64	RAMSEY																			0	0.0	$0
1	65	RED LAKE				1	51.5	$16,000	1	5.2	$1,700	1	30.0	$8,610							3	86.7	$26,310
5	66	REDWOOD							3	49.4	$33,030	3	138.1	$128,777							6	187.5	$161,807
6	67	RENVILLE				4	193.0	$181,195	5	74.1	$53,172	11	267.3	$267,198							20	534.4	$501,565
7	68	RICE				5	82.8	$59,510				2	18.7	$10,679							7	101.5	$70,189
5	69	ROCK				1	26.6	$9,749				1	7.8	$4,194							2	34.4	$13,943
7	70	ROOT RIVER							1	56.0	$16,474	3	34.4	$12,256	14	714.0	$128,344				18	804.4	$157,074
1	71	ROSEAU																			0	0.0	$0
3	72	NORTH ST. LOUIS																			0	0.0	$0
3	73	SOUTH ST. LOUIS																			0	0.0	$0
4	74	SCOTT										2	17.0	$12,224							2	17.0	$12,224
4	75	SHERBURNE																			0	0.0	$0
6	76	SIBLEY				5	69.6	$63,000				3	63.0	$59,800							8	132.6	$122,800
4	77	STEARNS	1	33.8	$9,403	1	19.8	$10,000				1	13.3	$3,622							3	66.9	$23,025
7	78	STEELE										2	23.1	$20,962							2	23.1	$20,962
2	79	STEVENS							3	48.0	$37,407	3	78.1	$57,383	4	131.8	$63,823				10	257.9	$158,613
5	80	SWIFT				3	66.6	$41,000	1	18.6	$13,000	7	259.3	$164,358							11	344.5	$218,358
2	81	TODD																			0	0.0	$0
2	82	TRAVERSE				1	80.0	$60,000													1	80.0	$60,000
7	83	WABASHA				1	12.5	$9,544	2	11.9	$10,317	5	54.0	$36,649	38	1428.1	$541,939				46	1506.5	$598,449
2	84	WADENA	5	86.4	$19,023																5	86.4	$19,023
6	85	WASECA										1	2.3	$1,389	3	58.3	$23,088				4	60.6	$24,477
4	86	WASHINGTON																			0	0.0	$0
6	87	WATONWAN																			0	0.0	$0
2	88	WILKIN																			0	0.0	$0
7	89	WINONA										1	10.2	$4,519	5	144.0	$41,411				6	154.2	$45,930

1989 RIM RESERVE PRELIMINARY SIGNUP INFORMATION
REVISED 10/16/89

area	um	DISTRICT	SENSITIVE GRD. WATER			WETLAND RESTORATION			RIPARIAN LANDS			MARGINAL AG. LANDS			PASTURED HILLSIDES			LIVING SNOWFENCE			GRAND TOTALS		
			# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EAS	# ACRE	TOTAL $	# EASE	# ACRE	TOTAL $
4	90	WRIGHT	3	26.1	$14,356	1	34.0	$27,528				1	6.2	$2,654	2	34.0	$11,149				7	100.3	$55,687
5	91	YELLOW MEDICINE				2	157.0	$126,600													2	157.0	$126,600
		TOTALS	20	510.0	$218,683	113	3,705.0	$2,422,319	32	597.9	$434,548	125	2,660.9	$1,650,675	137	4,650.5	$1,555,901	0	0.0	$0	427	12,124.3	$6,282,126
																					427	12,124.3	$6,282,126

DRAFT

1989
RIM ADMINISTRATIVE PAYMENTS
REVISED 10/16/89

DISTRICT	INDEX	INDEX PAYMENT	BASE PAYMENT	TOTAL PAYMENT
AITKIN	2.50	$1,588	$1,000	$2,588
ANOKA	0.00	$0	$400	$400
BECKER	4.25	$2,700	$1,600	$4,300
BELTRAMI	11.25	$7,146	$1,100	$8,246
BENTON	6.75	$4,288	$2,100	$6,388
BIG STONE	16.25	$10,322	$500	$10,822
BLUE EARTH	3.00	$1,906	$1,500	$3,406
BROWN	17.75	$11,275	$1,200	$12,475
CARLTON	0.00	$0	$300	$300
CARVER	11.50	$7,305	$1,100	$8,405
CASS	1.00	$635	$300	$935
CHIPPEWA	2.75	$1,747	$1,000	$2,747
CHISAGO	4.75	$3,017	$2,600	$5,617
CLAY	13.00	$8,258	$1,800	$10,058
CLEARWATER	6.00	$3,811	$500	$4,311
COOK	0.00	$0	$400	$400
COTTONWOOD	49.75	$31,602	$900	$32,502
CROW WING	0.00	$0	$300	$300
DAKOTA	4.75	$3,017	$1,600	$4,617
DODGE	1.75	$1,112	$600	$1,712
DOUGLAS	44.75	$28,426	$1,500	$29,926
FARIBAULT	30.50	$19,374	$600	$19,974
FILLMORE	12.00	$7,623	$2,500	$10,123
FREEBORN	11.50	$7,305	$2,000	$9,305
GOODHUE	30.50	$19,374	$2,800	$22,174
GRANT	10.25	$6,511	$300	$6,811
HENNEPIN	2.00	$1,270	$300	$1,570
HUBBARD	0.75	$476	$700	$1,176
ISANTI	13.00	$8,258	$4,000	$12,258
ITASCA	4.75	$3,017	$400	$3,417
JACKSON	14.50	$9,211	$1,300	$10,511
KANABEC	1.50	$953	$500	$1,453
KANDIYOHI	28.00	$17,786	$2,400	$20,186
KITTSON	4.50	$2,859	$1,200	$4,059
KOOCHICHING	1.00	$635	$300	$935
LAC QUI PARLE	3.25	$2,064	$800	$2,864
LAKE	0.00	$0	$300	$300
LAKE OF THE WOODS	0.00	$0	$800	$800
LESUEUR	9.25	$5,876	$1,400	$7,276
LINCOLN	12.25	$7,781	$1,000	$8,781
LYON	13.00	$8,258	$800	$9,058
MAHNOMEN	0.00	$0	$600	$600
MARSHALL-BELTRAMI	2.50	$1,588	$700	$2,288
MARSHALL	3.75	$2,382	$1,300	$3,682
MARTIN	15.00	$9,528	$1,300	$10,828
MCLEOD	33.75	$21,439	$1,200	$22,639
MEEKER	19.75	$12,546	$1,800	$14,346
MILLE LACS	15.00	$9,528	$900	$10,428

1989
RIM ADMINISTRATIVE PAYMENTS
REVISED 10/16/89

DISTRICT	INDEX	INDEX PAYMENT	BASE PAYMENT	TOTAL PAYMENT
MORRISON	48.25	$30,650	$2,500	$33,150
MOWER	8.50	$5,399	$600	$5,999
MURRAY	16.75	$10,640	$1,000	$11,640
NICOLLET	3.25	$2,064	$800	$2,864
NOBLES	1.75	$1,112	$600	$1,712
NORMAN	12.75	$8,099	$1,500	$9,599
OLMSTED	5.25	$3,335	$1,300	$4,635
EAST OTTER TAIL	1.00	$635	$2,700	$3,335
WEST OTTER TAIL	5.50	$3,494	$1,700	$5,194
PENNINGTON	1.00	$635	$1,000	$1,635
PINE	0.00	$0	$400	$400
PIPESTONE	7.00	$4,447	$500	$4,947
EAST POLK	3.75	$2,382	$2,600	$4,982
WEST POLK	0.00	$0	$700	$700
POPE	34.00	$21,598	$1,700	$23,298
RAMSEY	0.00	$0	$300	$300
RED LAKE	5.50	$3,494	$600	$4,094
REDWOOD	29.50	$18,739	$1,100	$19,839
RENVILLE	67.00	$42,560	$1,000	$43,560
RICE	16.00	$10,164	$1,900	$12,064
ROCK	2.75	$1,747	$400	$2,147
ROOT RIVER	15.50	$9,846	$1,900	$11,746
ROSEAU	1.50	$953	$1,500	$2,453
NORTH ST. LOUIS	0.00	$0	$400	$400
SOUTH ST. LOUIS	0.00	$0	$400	$400
SCOTT	19.00	$12,069	$2,500	$14,569
SHERBURNE	0.00	$0	$2,600	$2,600
SIBLEY	45.25	$28,744	$1,200	$29,944
STEARNS	3.50	$2,223	$3,400	$5,623
STEELE	5.50	$3,494	$900	$4,394
STEVENS	28.00	$17,786	$700	$18,486
SWIFT	20.50	$13,022	$1,100	$14,122
TODD	2.00	$1,270	$1,400	$2,670
TRAVERSE	1.00	$635	$500	$1,135
WABASHA	37.75	$23,980	$2,000	$25,980
WADENA	13.75	$8,734	$1,300	$10,034
WASECA	4.00	$2,541	$600	$3,141
WASHINGTON	0.00	$0	$500	$500
WATONWAN	1.00	$635	$1,300	$1,935
WILKIN	3.00	$1,906	$800	$2,706
WINONA	10.00	$6,352	$1,800	$8,152
WRIGHT	26.00	$16,516	$2,000	$18,516
YELLOW MEDICINE	8.50	$5,399	$700	$6,099
	1009.25	$641,100	$108,900	$750,000

Minnesota Board of Water & Soil Resources

Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, Minnesota 55107
(612) 296-3767

TO: Wayne Edgerton

FROM: Jeff Nielsen

DATE: October 12, 1989

RE: CURTIS ARNDT
RIM LAND EXCHANGE 17-12-86-1

On October 11, 1989 Brian Dwight, Tabor Hoek and I reviewed the Curtis Arndt RIM acres. We agreed that the proposed 7.4 acre land exchange would be eligible and acceptable. We then met with Mr. Arndt and proposed several options to him. We believe he picked an option that is most favorable to the RIM Program and the State of Minnesota. This is why I'm only submitting one proposal.

PROPOSAL

1. Exchange the 7.4 acres of land for an adjacent area westerly and slightly south of the current enrolled land. This frees up and releases the current 7.4 acres to Mr. Arndt for a gravel pit operation.

2. Convert the remaining area and the new area into a 32.0 acre RIM perpetual easement. This is where the real benefit comes to the State and the resource with minimal additional expense.

   32.0 acres RIM Easement
   - 9.0 acres Originally Donated
   23.0 acres Eligible for Payment

   He already received $523.00 per acre in 1987 for a limited easement. Presently the payment rate for a perpetual easement is $773.25/acre, leaving us a difference of $250.25/acre or a total payment of $5755.75 to Mr. Arndt to re-establish a new 32.0 acre perpetual easement.

3. Administrative costs will be born by the landowner for an abstract update, title insurance if needed, and recording of the easement at the Courthouse.

4. Seeding of the new 7.4 acre area will be done according to the new conservation plan agreement at no cost to the RIM Reserve Program.

If you have any questions, please give me a call.

sms

Regional Offices

Northwest Region
1819 Bemidji Ave.
Bemidji, MN 56601
218-755-3963

Northeast Region
Government Service Center
320 W. 2nd Street
Room 603
Duluth, MN 55802
218-723-4752

West Central Region
611 Iowa Avenue
Staples, MN 56479
218-894-1692

South Central Region
Box 756
New Ulm, MN 56073
507-354-2196

Southeast Region
Friedell Bldg., Room 100
1200 S. Broadway
Rochester, MN 55904
507 285-7458

Southwest Region
Box 111
1400 E. Lyon Street
Marshall, MN 56258
507-537-7260

East Central Region
Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, MN 55107
612-296-3767

An Equal
Opportunity Employer

Cottonwood Co. NOT to scale Springfield G-10

T2094 16-43

PROPERTY BOUNDRY

R.I.M. EASEMENT

① ② ③ ④ FIELD #

RR-1 PRACTICE #

SPECIAL NOTE

FLD # ③ IS INCLUDED IN EASEMENT BUT NO PAYMENT WILL BE RECIEVED. COVER IS ALREADY EST.

— PROPOSED SITE FOR NEW RIM LAND. 7.4 ac.

— Original RIM LAND 7.4 ac.

1 3020

RR-1 ① 2 8.2 8.2

5.2

16-375

T2095

④ 7.4 Ac. RR-1

Field Drive

③ 7.0 Ac. EST.

3 93.5

500'

644'

8-553

T2269

R. 37 W.

94B 595C 41B

130 102B 41B 41A 313 1834 1833 884 595C 887B 94B 41B River 31D 247 Moines 31E 255

1 75.1

16-199

8-553 T2268 8-553

Overview of the Rice Creek Watershed District "509" Watershed Management Plan
For the October 25, 1989 BWSR Board Meeting

Introduction

The Rice Creek Watershed District was established on January 18, 1972 by the former Minnesota Water Resources Board. The RCWD is 201 square miles in size. Located in the northern portion of the Twin Cities, RCWD covers portions of four counties; Anoka, Hennepin, Ramsey and Washington. It includes all or parts of 30 cities and townships:

Cities: Centerville, Circle Pines, Columbus Heights, Fridley, Ham Lake, Lexington, Lino Lakes, Blaine, Spring Lake Park, St. Anthony, Arden Hills, Falcon Heights, Lauderdale, Mounds View, New Brighton, Shoreview, Roseville, White Bear Lake, Birchwood Village, Dellwood, Forest Lake, Hugo, Mahtomedi, Willernie.

Townships: Columbus, White Bear, Forest Lake, Grant, May, New Scandia.

Watershed Description

The western and northwestern portion of the RCWD is considered to be part of the Anoka Sandplain. The remainder of the watershed is considered to be part of the Eastern St. Croix Moraine. Rice Creek flows generally westerly and outlets in the Mississippi River within the City of Fridley. The lower 25 percent of the watershed is predominantly urban. The upper watershed is primarily rural over the remainder of the watershed, with the exception of the City of White Bear Lake area.

Staff Review

On August 17, 1989 BWSR staff toured the watershed with two RCWD representatives, the RCWD Engineer and a DNR Representative. The plan contains several unique features, most notably; 1) a proposed cost-share program to help fund erosion control projects and 2) a wetland preservation policy/procedure to evaluate the merits of wetland filling with respect to nutrient assimilation and flood storage values.

The RCWD received a number of written comments from local units of government expressing various concerns. It appears that most of the cities worked up a joint position statement and sent that to the RCWD under their own letterhead. The concerns expressed included:

1. The water quantity implementation approach.
2. The water quality protection approach.
3. Overall management of the Rice Creek trunk itself.
4. Duplication of effort with other agencies.
5. High implementation cost.
6. Ditch modification restrictions.

BWSR sent a letter to the RCWD on October 23, 1989 which outlined a number of plan deficiencies, suggestions for improvement and items which needed clarification. Among the issues identified are:

- drafting of a management matrix clearly identifying local plan content
- the need for a complete wetland inventory
- adoption of the National Wetlands Inventory and the DNR protected waters inventory
- adoption of erosion control standards for construction sites
- RCWD positions related to DNR, MPCA, MHD, three SWCD's as well as from the cities and townships

Staff will being arranging a meeting in the near future with the RCWD and their engineer to go over these concerns. Due to the number of communities involved and a wide array of issues identified, it may be several months before plan revisions can be incorporated so that BWSR can take action on the plan. The plan appears to be comprehensive and in the spirit of the Metropolitan Surface Water Management Act.

By: BDS, 10/23/89

A:\RICECRK\RICEOVR.VEW

Overview
West Mississippi Watershed Management Commission "509" Plan
For The October 25, 1989 BWSR Board Meeting

INTRODUCTION

The West Mississippi Watershed Management Commission is located north western Hennepin County , it is approximately 23.5 square miles. The West Mississippi Watershed Management Organization was established in 1984 through a Joint Powers Agreement between the cities of: (order according to area contribution)
Brooklyn Park, Champlin, Brooklyn Center, Maple Grove, Osseo

WATERSHED DESCRIPTION

The WMC area is composed mainly of Sand and gravel outwash and glacial till with drainage ranging poor to well. Areas along the river are oak openings and barrens, the eastern section of watershed is prairies. Land use types are fairly typical of developed and developing suburban areas, proximity to Mpls. is a factor influencing land use. Glacial deposits vary in thickness over the bedrock aquifers.

Nearly half of the WMC area drains directly into the Mississippi river, the rest of the area drains into Edinbrook and Oxbow creeks.

Major concerns of the WMWMC include the protection of water table aquifers from contamination, flood plain and shoreland management, surface water quality management and control of sedimentation and erosion. Current problem in the area is with runoff management (ponding and treatment) where surcharges occur following a storm.

STAFF REVIEW

Like most plans that have been reviewed by staff to date, a number of revisions, suggestions for improvement and clarifications are needed. The plan contains no capital improvement program. The plan proposes, however, to design and implement a water quality monitoring program. The plan also proposes to accomplish the following studies :

1- Edinbrook & Oxbow creeks flood profiles
2- Drift aquifers recharge

The following plan revisions and clarifications to the plan are being sought by staff through negotiations:

- Management matrix for the five communities involved and clearer direction on what should be in each local plan
- How will the data acquired from the above mentioned studies will be utilized and or incorporated into existing flood studies.
- Merits of the 3 year time table for local plan adoption process with no direct WMC regulatory authority .
- Adoption of policy language which acknowledges the National Wetlands Inventory and the DNR protected waters and their respective regulatory programs.
- Clarification of the MPCA's allegation that the WMC surface water classification system is in violation of state rule and law.

FN:WMISSWMO.OVR
By BDS and SH 10/24/89

Status of "509" Plan Currently Under BWSR Review

Black Dog Lake WMO - Received plan revisions on Oct. 11, 1989. Staff still has problems with some of the revised text. A meeting is scheduled for Nov. 8, 1989 with BDLWMO and their engineer to attempt to resolve differences. Originally, staff intended on bringing this plan to the Board for approval at the Oct. 25, 1989 regular meeting.

Browns Creek WMO - This plan has had preliminary review by staff. No major revisions to this plan appear to be needed. An Overview of this plan will be given to the Board at the November, 1989 regular meeting.

East Mississippi WMO - The consultant (SEH) has sent a letter to all the members of the Joint Powers Agreement asking to set up a meeting to discuss BWSR concerns. According to our information, they do not have a chairman. The EMWMO last met on March 31, 1987.

Forest Lake WMO - Hearing held 10/24/89 before BWSR Dispute Resolution Committee. Action on plan expected at November, 1989 board meeting.

Sunrise River WMO - Letter sent to SRWMO Chairman on Sept. 6, 1989 outlining needed and suggested revisions. No response to date.

Shingle Creek WMC - This review of this plan is being coordinated with the review of the West Mississippi WMC plan. The two plans were drafted by the same consultant and the Chairman for both is the same person.

General Status

BWSR has essentially caught up with DNR and MPCA review of "509" plans. The problem is that they, like us, are also slightly behind the Met Council's date of action (by about 4 months). In November BWSR staff's goal is to initiate review on two plans; **Shakopee Basin and Sand Creek.** Our December goal is to initiate review of the **Credit River and Middle St. Croix** plans. This will put us in fairly good shape if these goals can be achieved. Work on the Metro Water Management Task Force report due on December 15 may interfere with achieving these goals, however.

According to our files, three plans (Lower Rum, Central Ramsey and Southwest Ramsey) have never been submitted to the state agencies for review even though Met Council has acted on them. Staff will be contacting the respective WMO's and reminding them of that fact as time allows in the near future.

Staff estimate that from 3 to 5 additional "509" plans may be brought before the Board for final action in November and December, depending upon the ability of the affected WMO's to adopt negotiated revisions.

FN:A:509STAT.REP BS, 10/24/89

cc Agency Representatives

10/25/89

FY1990
Minnesota Forestry Improvement Program (MFIP)
Recommended Allocations

SWCD	Tentative Allocation	Landowner Requests	Final Allocation
Aitkin	3,896	21,447	3,896
Becker	2,500	11,576	7,500
Beltrami	2,566	0	0
Carlton	4,222	4,546	4,222
Chisago	1,579	0	0
Clay	1,500	1,778	1,778
Clearwater	2,566	3,216	2,566
Crow Wing	1,901	3,573	1,901
Douglas	12,000	41,730	12,000
Fillmore	2,899	5,300	2,899
Goodhue	2,566	3,485	3,095
Hubbard	2,234	2,150	2,150
Isanti	1,247	0	0
Itasca	3,896	2,393	2,393
Koochiching	1,579	0	0
Lake	1,569	7,068	1,569
Lake of The Woods	4,000	5,929	4,000
Marshall-Beltrami*	0	3,125	3,125
Mille Lacs	1,247	0	0
Morrison	1,901	3,345	1,901
North St. Louis	3,896	5,610	3,896
Ottertail (West)	10,500	12,400	12,400
Ottertail (East)	10,500	24,390	15,087
Pine	1,901	3,750	1,901
Pope	8,000	37,040	8,000
Root River (Houston)	4,500	0	0
Roseau	1,901	2,500	1,901
South St. Louis	5,402	4,288	4,288
Wabasha	3,231	13,741	3,231
Wadena	2,899	3,699	2,899
Winona	5,402	6,500	5,402
Totals	114,000	232,186**	114,000

In determining final allocations, priority was given to requests for replanting drought killed trees on CRP lands.

Funding Summary

Transferred from DNR	120,000
BWSR Administration	6,000
SWCD Allocation	114,000

* The landowner request was in the Beltrami County portion of the SWCD

** Of this total, $128,457 (55%) was requested for replanting drought killed trees on CRP lands.

GL:lb

Minnesota Board of Water & Soil Resources

Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, Minnesota 55107

(612) 296-3767

October 17, 1989

TO: Board of Water and Soil Resources Members, Staff, and Advisors

FROM: Jim Birkholz, Executive Director

SUBJECT: October 25, 1989 Board Meeting

Enclosed is the agenda for the October 25, BWSR meeting.

PLEASE NOTE THE MEETING LOCATION HAS CHANGED TO THE GOLDEN STEER, 1010 SOUTH CONCORD STREET, SOUTH ST. PAUL, MINNESOTA.

The meeting location has been changed do to a shift in our administrative relationship with the Department of Agriculture. Effective October 13, 1989, our staff has assumed responsibility for all accounting transactions formerly carried out by the Department of Agriculture accounting staff. Commissioner Nichols ordered this change and also established a new fee schedule for rental of conference room space at the department. He has since retracted the conference room charge for the remainder of the fiscal year but in the interim we made arrangements for the October meeting at the Golden Steer. Suffice it to say we are scrambling to carry out all the necessary accounting transactions while receiving some limited short-term assistance from Department of Agriculture staff. One of the items which you as Board Members can help with is to fill out your expense reports more completely than you have been required in the past. We will discuss this and related items at the Board meeting.

Following is information about agenda items:

- 110B Comprehensive Local Water Plans. The first three plans, Watonwan, Beltrami, and Clearwater Counties, are scheduled for approval at the meeting. This is a significant landmark achievement as the initial local water plans go from the approval phase to the implementation phase. Staff is awaiting minor additions to the plans and anticipates recommendations for approval at the meeting.

Regional Offices

Northwest Region
1819 Bemidji Ave.
Bemidji, MN 56601
218-755-3963

Northeast Region
Government Service Center
320 W. 2nd Street
Room 603
Duluth, MN 55802
218-723-4752

West Central Region
611 Iowa Avenue
Staples, MN 56479
218-894-1692

South Central Region
Box 756
New Ulm, MN 56073
507-354-2196

Southeast Region
Friedell Bldg., Room 100
1200 S. Broadway
Rochester, MN 55904
507-285-7458

Southwest Region
Box 111
1400 E. Lyon Street
Marshall, MN 56258
507-537-7260

East Central Region
Southbridge Office Building
155 South Wabasha Ave., Suite 104
St. Paul, MN 55107
612-296-3767

An Equal
Opportunity Employer

Representatives from the Legislative Commission on Minnesota Resources and the State Planning Agency have also been invited for this agenda item. Board staff and Bill Alden from the Hubbard SWCD, will overview the Hubbard County plan. Also enclosed in the packet you will find a 110B Comprehensive Water Planning County Status Report for your review.

- RIM Reserve Program. The latest sign-up for the RIM Reserve Program resulted in approximately $6.3 million worth of sign-ups with approximately $4.4 million in funds available for the program. SWCD staff will spend the next month conducting preliminary easement work to determine the feasibility of all the applicants. Also local screening committees will meet to prioritize the applications. At the October meeting you will be requested to approve the allocation of the service grants to SWCDs to implement the easements. Attached is a preliminary staff recommendation for the administrative payments. Also enclosed is a summary of the preliminary sign-up information. One additional item is action on the proposed Curtis Arndt RIM land exchange in Cottonwood County. Enclosed you will find a staff review of the proposal and a recommendation. Staff recommends approval of this land exchange under certain conditions.

- Metropolitan Water Planning. Two plan overviews are scheduled along with a status report. No plans are scheduled for approval this month.

- Minnesota Forestry Improvement Program. The results of the MFIP sign-up which ended September 28, are being compiled by DNR and BWSR staff, and will be available at the meeting. Applications have exceeded available funds. The joint DNR/BWSR staff recommendations will be brought to the Board for decision.

Please call Chairman Ogaard or myself if you need additional information about the meeting. Please remember the change in meeting location. Travel safely, we'll see you at the Golden Steer on the 25th!

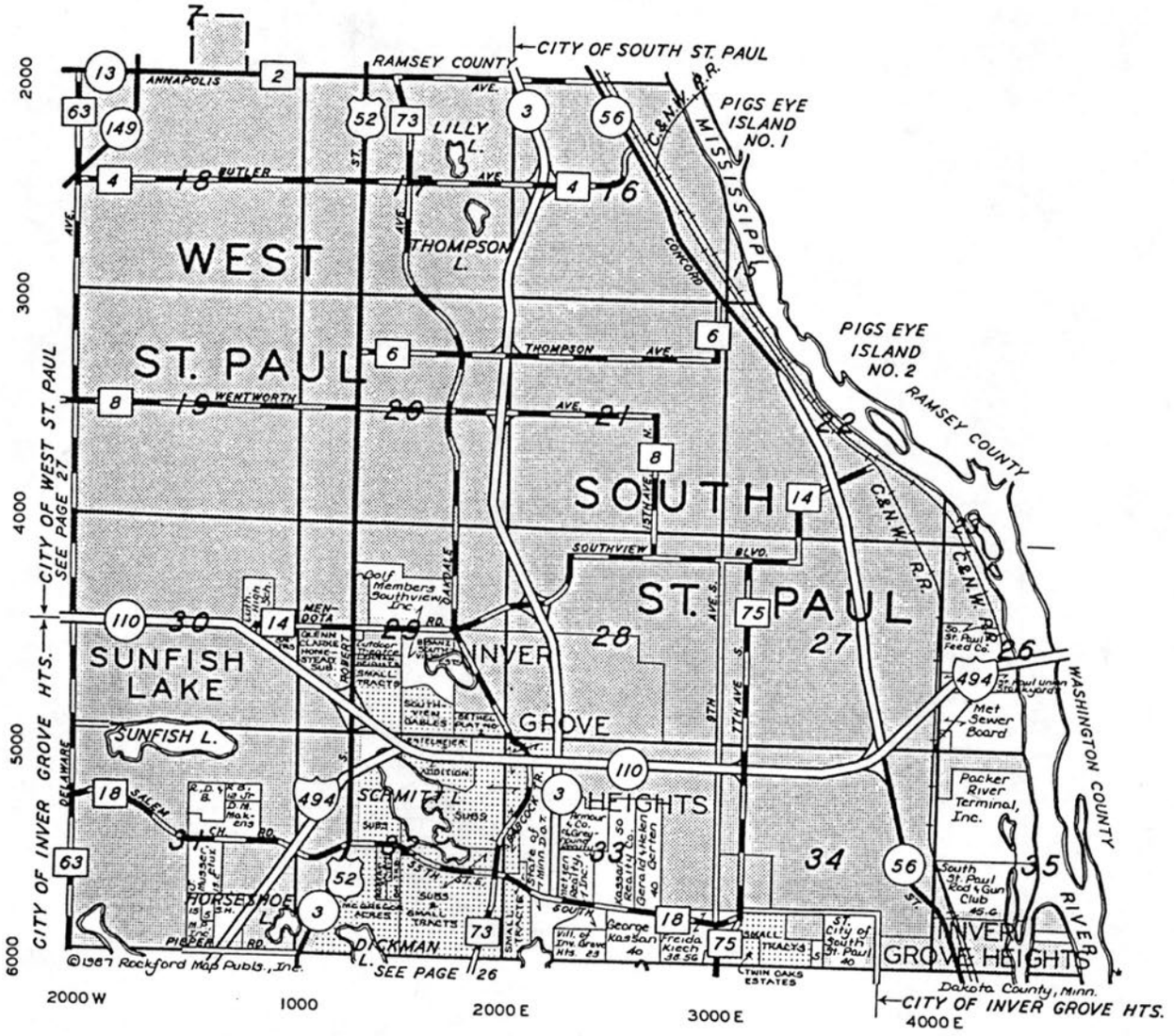
BOARD OF WATER AND SOIL RESOURCES
GOLDEN STEER
SOUTH ST. PAUL, MINNESOTA
OCTOBER 25, 1989

PRELIMINARY AGENDA

9:00 a.m.	1.	Call to Order
	2.	Adopt Agenda
	3.	Approval of Minutes of September 27, 1989
	4.	Reports - Chairman's Report -- Donald Ogaard - Executive Director's Report -- Jim Birkholz - first quarter budget report - expense report update - EQB/Water Resources Committee Report -- Loni Kemp - Assessment of tax bill impact on BWSR programs -- Greg Larson - Tabled item from 9/27/89 meeting -- Clay SWCD cost-share request
10:00	5.	Wellhead Protection Video -- Bruce Olson, Minnesota Department of Health
10:30	6.	East Central Administrative Region Report -- Mark Nelson
11:00	7.	110B Comprehensive Local Water Plans - Plans for approval: Watonwan, Beltrami, Clearwater - Plan overview: Hubbard County -- Dan Steward and Bill Alden, Hubbard SWCD - Status Report
	8.	Advisors' Comments
Noon		Lunch
1:00 p.m.	9.	RIM Reserve Program - Sign-up results -- for information - Allocation of service grants to SWCDs -- for decision - Proposed Curtis Arndt, Cottonwood County, RIM land exchange -- for decision
2:00	10.	Metropolitan Water Planning - Plan Overviews: Rice Creek WMO and West Mississippi WMO - Status Report - No plan approvals
2:30	11.	Minnesota Forestry Improvement Program allocations - for decision -- Greg Larson
3:00		Adjourn

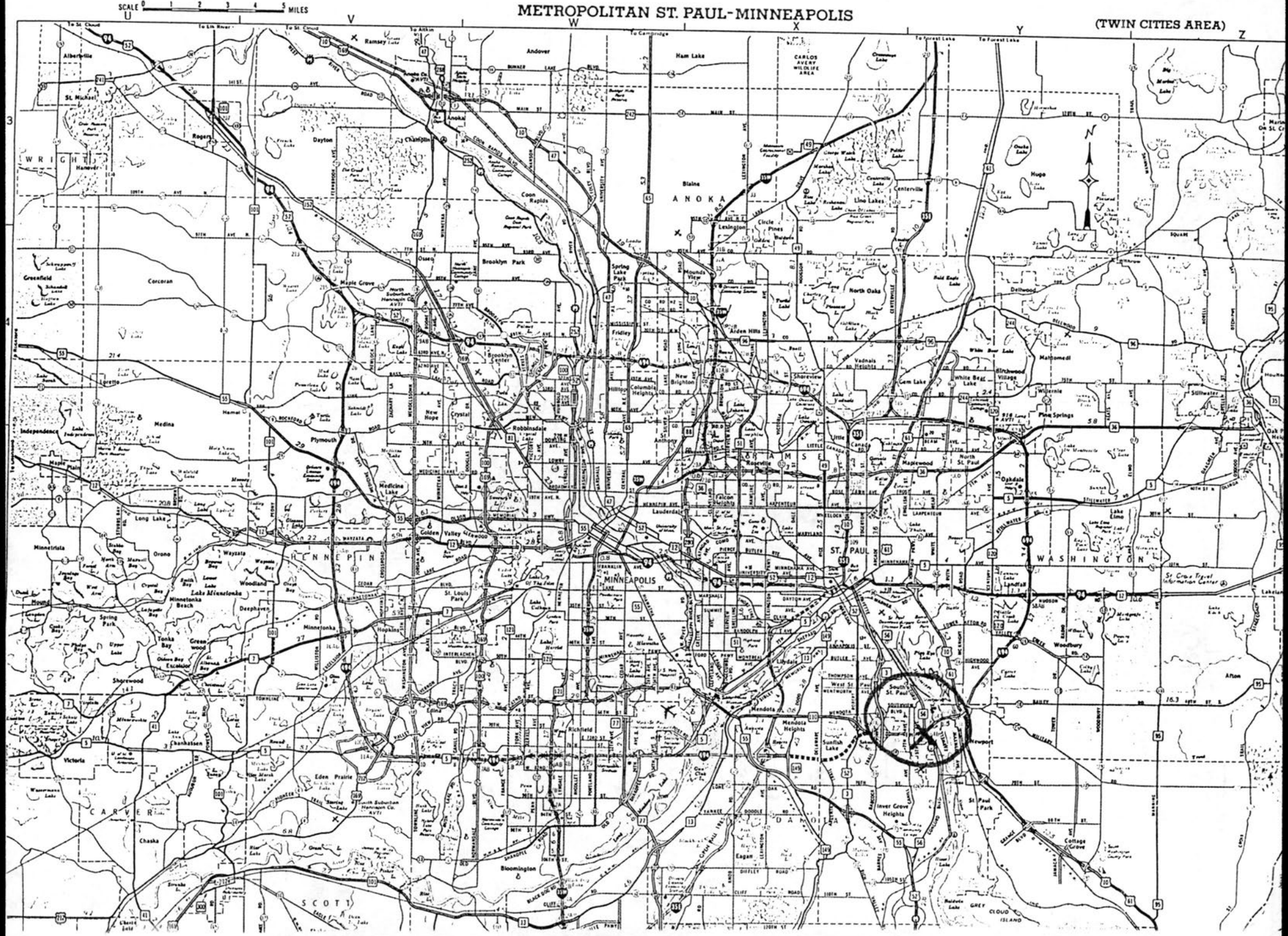
28 CITY OF WEST ST. PAUL NORTH PART CITY OF SOUTH ST. PAUL
NORTH PART CITY OF INVER GROVE HEIGHTS

T. 28N.-R. 22W.



METROPOLITAN ST. PAUL-MINNEAPOLIS

(TWIN CITIES AREA)



BOARD OF WATER & SOIL RESOURCES
110B COMPREHENSIVE WATER PLANNING
COUNTY STATUS REPORT

October 16, 1989

COUNTY	RESOLUTION TO PLAN (DATE)	INDEPENDENT COUNTY	PART OF REGIONAL PLANNING GROUP	SUBMITTED FOR PRELIMINARY REVIEW (DATE)	SUBMITTED FOR FINAL REVIEW (DATE)	BWSR BOARD ACTION	BWSR PLAN APPROVAL (DATE)	SCHEDULED PLAN UPDATE (DATE)
AITKIN	9/15/87		MH					
BECKER	YES		RRV	8/04/89				
BELTRAMI	10/27/87		MH	6/05/89	8/09/89			
BENTON	10/19/88	X						
BIG STONE								
BLUE EARTH	6/24/86		SC					
BROWN	8/24/87		SC	9/01/89				
CARLTON	12/8/87	X						
CASS	10/9/87		MH	8/23/89				
CHIPPEWA								
CHISAGO								
CLAY	YES		RRV	8/04/89				
CLEARWATER	10/28/87		MH	6/05/89	8/09/89			
COOK								
COTTONWOOD	8/18/87		SC					
CROW WING	11/3/87		MH					
DODGE	12/22/87		RZ	8/21/89				
DOUGLAS	5/24/88	X		8/15/89				
FARIBAULT	6/17/86		SC					
FILLMORE	12/8/87		RZ	8/30/89				
FREEBORN	6/23/86		SC	10/01/89				
GOODHUE	12/15/87		RZ	7/31/89				
GRANT	YES		RRV	8/04/89				
HOUSTON	12/8/87		RZ	9/25/89				
HUBBARD	10/7/87		MH	7/05/89	10/03/89			
ISANTI								
ITASCA	10/27/87		MH					
JACKSON	6/23/86		SC					
KANABEC								
KANDIYOHI								
KITTSON	10/6/87		RRV	8/04/89				
KOOCHICHING								
LAC OUI PARLE								
LAKE								
LAKE OF THE WOODS								
LESUEUR	6/24/86		SC					
LINCOLN	9/15/87		RC					
LYON	10/10/87		RC					
MCLEOD								
MAHNOMEN	10/13/87		RRV	8/04/89				
MARSHALL	10/20/87		RRV	8/04/89				
MARTIN	6/17/86		SC	6/1/89				
MEEKER								
MILLE LACS								

BOARD OF WATER & SOIL RESOURCES
110B COMPREHENSIVE WATER PLANNING
COUNTY STATUS REPORT

October 16, 1989

COUNTY	RESOLUTION TO PLAN (DATE)	INDEPENDENT COUNTY	PART OF REGIONAL PLANNING GROUP	SUBMITTED FOR PRELIMINARY REVIEW (DATE)	SUBMITTED FOR FINAL REVIEW (DATE)	BWSR BOARD ACTION	BWSR PLAN APPROVAL (DATE)	SCHEDULED PLAN UPDATE (DATE)
MORRISON	10/27/87		MH					
MOWER	12/15/87		RZ	8/04/89				
MURRAY	10/10/87		RC					
NICOLLET	7/15/86		SC					
NOBLES	YES	X		9/20/89				
NORMAN	YES		RRV	8/04/89				
OLMSTEAD	YES		RZ	8/07/89				
OTTER TAIL	YES		RRV	8/04/89				
PENNINGTON	YES		RRV	8/04/89				
PINE								
PIPESTONE	10/10/87		RC					
POLK	YES		RRV	8/04/89				
POPE								
RED LAKE	YES		RRV	8/04/89				
REDWOOD	10/10/87		RC					
RENVILLE								
RICE	12/8/87		RZ	8/23/89				
ROCK	7/01/89	X						
ROSEAU	YES		RRV	8/04/89				
ST. LOUIS								
SHERBURNE								
SIBLEY	6/24/86		SC					
STEARNS	2/3/88	X						
STEELE	6/24/86		SC	8/24/89				
STEVENS	YES		RRV	8/04/89				
SWIFT								
TODD	9/18/89	X						
TRAVERSE	YES		RRV	8/04/89				
WABASHA	12/22/87		RZ	8/27/89				
WADENA								
WASECA	7/1/86		SC	10/01/89				
WATONWAN	6/24/86		SC	4/89	8/01/89			
WILKIN	YES		RRV	8/04/89				
WINONA	2/23/88		RZ	9/06/89				
WRIGHT	6/20/89	X						
YELLOW MEDICINE	10/10/87		RC					
TOTALS								
81	59	8	51	36	4	0		

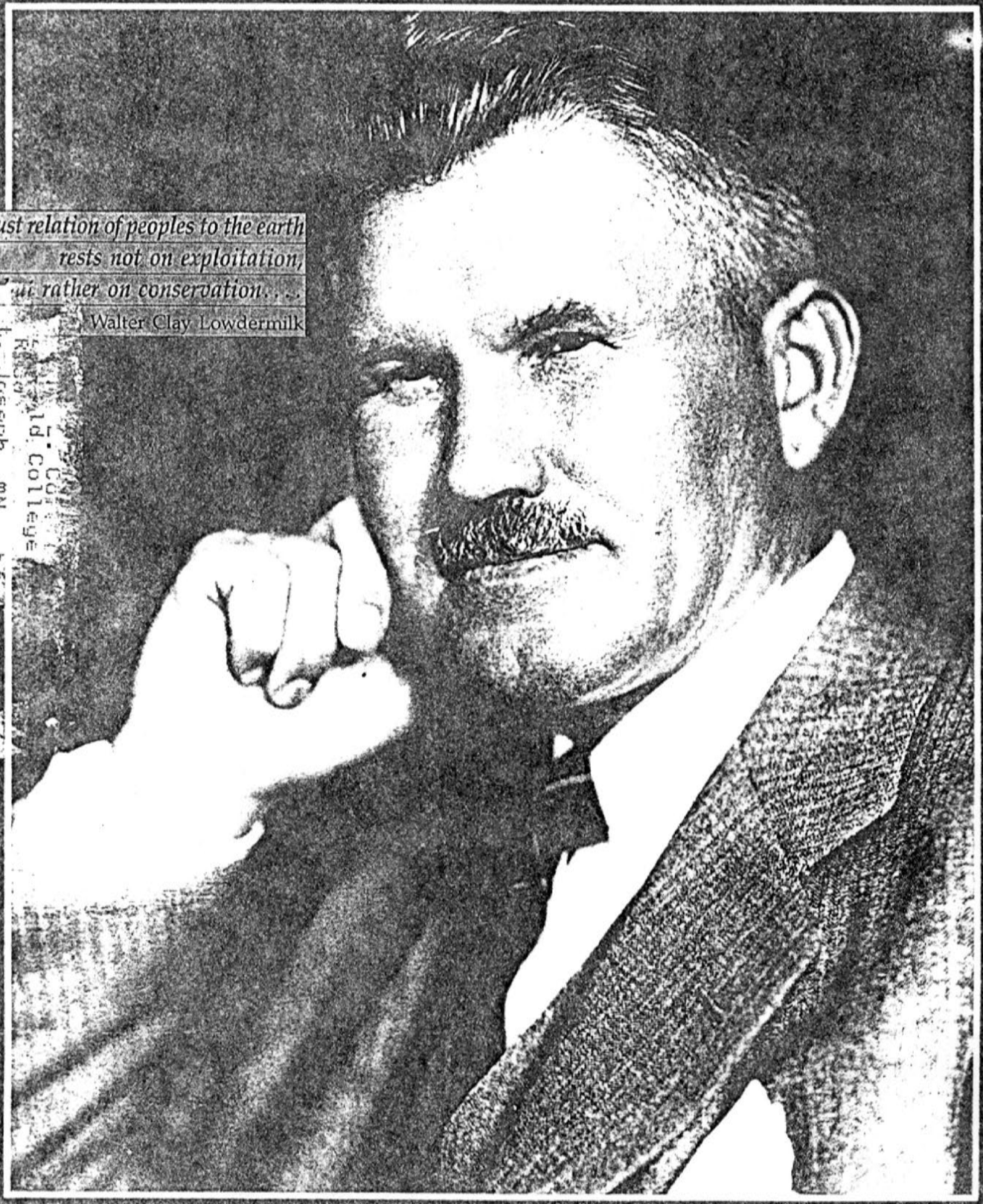
RRV - Red River Valley 15 Co. Joint Powers Board
MH - Mississippi Headwaters Board, 8 Counties
RC - Redwood-Cottonwood Rivers Control Area, 6 Counties
SC - South Central Watershed Planning Project, 13 Counties
RZ - Root-Zumbro Rivers Watershed, 9 County Joint Powers Board

X - Independent Conties, Counties preparing plans alone

Journal of Soil & Water Conservation

July-August 1988
Volume 43, Number 4

Conservation



A just relation of peoples to the earth rests not on exploitation, but rather on conservation. . . .

Walter Clay Lowdermilk

St. Joseph, MN



A Centennial Profile

WALTER CLAY LOWDERMILK

By J. Douglas Helms

WALTER Clay Lowdermilk was born on July 1, 1888, in Liberty, North Carolina. The family moved to Missouri, then to Oklahoma, and later to Arizona. Lowdermilk graduated from Park College Academy in Missouri and attended Park College and the University of Arizona, where he won a Rhodes scholarship. He studied at Oxford University for three years, earning a B.A. degree in 1914 and an M.A. degree in 1915. The summers allowed time to study forestry in Germany. While in Europe, he also served on Herbert Hoover's Belgian Relief Commission.

Lowdermilk returned to the United States in 1915 and began work as a forest ranger with the U.S. Forest Service in the Southwest, where he became particularly interested in soil erosion on rangeland. During World War I, he volunteered for the American Expeditionary Force and served as its timber acquisitions officer. He returned to the Forest Service in 1919 as regional research officer in Montana.

Seemingly, Lowdermilk had embarked on a career in forestry, but events soon changed his plans. Through the years in England, he had corresponded with Inez Marks, a friend from Arizona. A devout Methodist, Miss Marks had graduated from the University of Southern California and then applied to the Methodist board for overseas work. She had served in China since 1916 when she returned to the United States in 1921. Soon after she and Lowdermilk met to enjoy the 1922 Rose Bowl, they decided on marriage. She suggested that he combine his life's work with service to China. Chinese mission groups had increasingly emphasized agricultural work, and after the famine of 1920-1921, funds had been collected to work on famine prevention.

Lowdermilk applied for a teaching and research grant at the American Union University in Nanking to use his experience in forestry in the interest of famine prevention. While in China from 1922 to 1927, Lowdermilk focused on the problem of soil erosion in the drainage basin of the Yellow River. He traveled to the deep loess areas in Shansi province where the heavy load of silt originated. The deposited silt raised the river bed; during floods, the river broke out of its manmade levees and flooded the fertile Honan Plains. He and his Chinese associates compared runoff and erosion on the bared hillsides to the ancient, protected temple forests. The scientific articles on the experiments and resulting recommendations for soil-conserving action began to bring him international recognition.

J. Douglas Helms is an historian with the Soil Conservation Service, U.S. Department of Agriculture, P.O. Box 2890, Washington, D.C. 20013.

Lowdermilk returned to the United States in 1927, following the Communist uprising, and to the Forest Service as project leader for erosion and streamflow studies at the California Forest Experiment Station in Berkeley. He also completed a Ph.D. degree in 1929 at the University of California School of Forestry with minors in soil science and geology. The Buchanan Amendment in 1929 to the U.S. Department of Agriculture's appropriation act for 1930 provided for some erosion experiment stations. Under this appropriation, Lowdermilk designed and supervised the San Dimas Experiment Station in California to study forest hydrology.

His reputation for research on the process and consequences of soil erosion grew. In 1933, Lowdermilk became assistant chief of the Soil Erosion Service, a temporary agency created with New Deal emergency employment funds. Congress created the Soil Conservation Service in 1935 to extend soil conservation work to America's farmlands. In addition to other administrative duties as assistant chief of SCS, Lowdermilk concentrated especially on organizing the new agency's research program.

In 1938, he had an opportunity to see what America could learn from earlier civilizations about wise and unwise land use. From August 1938 until November 1939, he traveled in Europe, the Mediterranean area, and the Middle East, studying past land use practices and their results. Indeed, he often said his profession was to read the record farmers, nations, and civilizations had written on the land, then to use that knowledge to discover the basis for a lasting adjustment of human populations to the Earth. Lowdermilk wrote extensively on this topic and his travels. Some of his studies appeared in abbreviated form in the classic USDA pamphlet, "Conquest of the Land Through 7,000 Years."

Out of his trip to the Middle East came his book *Palestine: Land of Promise*, which proclaimed that, with sound conservation measures, the land could once again support a large population. Part of the plan to support a larger population was to make effective use of water in the Jordan River. While he would eventually work in the new state of Israel, his reputation as the father of a coordinated water and conservation plan for Palestine dates from this book.

During World War II, Chinese government officials requested that Lowdermilk assist them. In 1942 and 1943, he and a staff of eight Chinese specialists traveled nearly 7,000 miles throughout northwestern China in the Yellow River drainage basin. There they looked for indigenous, soil-conserving methods of farming, meanwhile setting up demonstrations of simple conservation practices based on American experience.

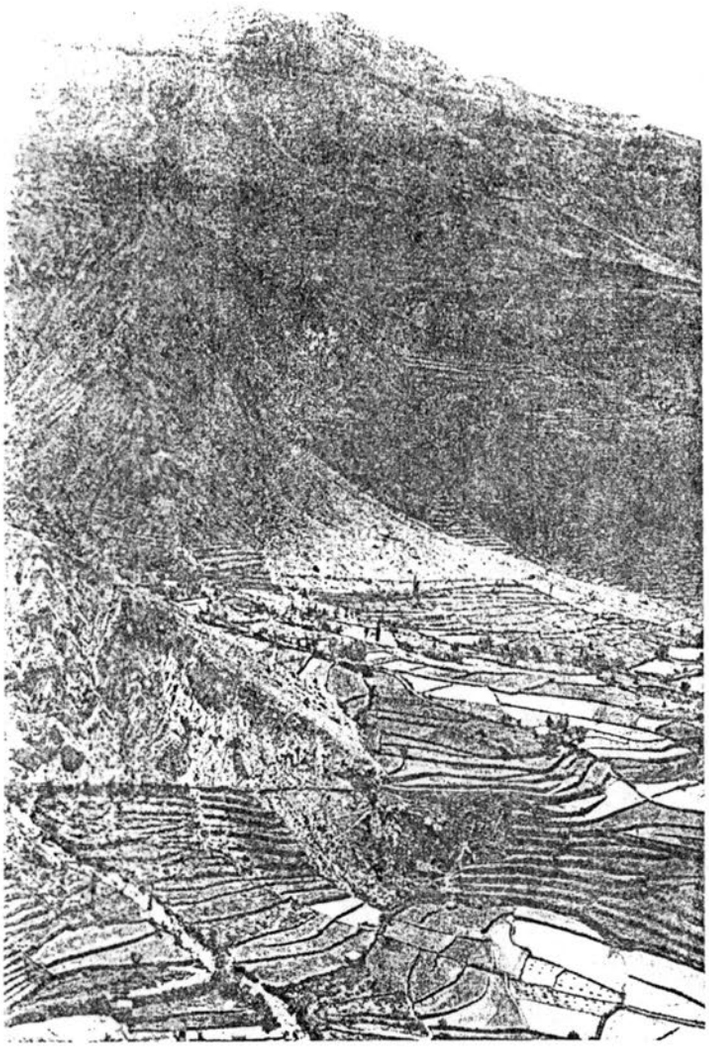
After his retirement from SCS in 1947, Lowdermilk was often called upon to advise on soil and water conservation projects in foreign countries. At the request of the French colonial government, he traveled to Morocco and Algeria in 1948 to study land use problems. During 1949-1950, he was a consultant to the British colonies in central and southern Africa. In 1950, he was chairman of the Committee on Standards for Basic Data of the President's Water Resources Policy Commission. He worked for the Natural Resources Division of the Supreme Allied Command in Japan in 1951. Thereafter, Lowdermilk worked on a number of projects sponsored by the United Nations Food and Agriculture Organization, which sponsored his work in Israel from 1951 through 1954 to organize a Soil Conservation Service. During 1954, he also worked with the United Nations in New York on a coordinated water policy. He was a visiting professor at the Technion University at Haifa from 1955 to 1957. Another United Nations project in 1957 involved formulating a river basin development plan for the Cetina River in Yugoslavia. From 1960 to 1969, he was a consultant for the Save-the-Redwoods League in California.

Lowdermilk received numerous awards for his work. His professional honors included election as a fellow of the American Geophysical Union and of the Society of American Foresters. He served as AGU president from 1941 to 1944. In addition to awarding him an honorary doctorate, Technion University in Haifa named its Lowdermilk School of Agricultural Engineering in his honor. The Israelis also have dedicated a grove of trees in Galilee to his memory.

Walter Lowdermilk died on May 6, 1974, and is buried in Altadena, California. □

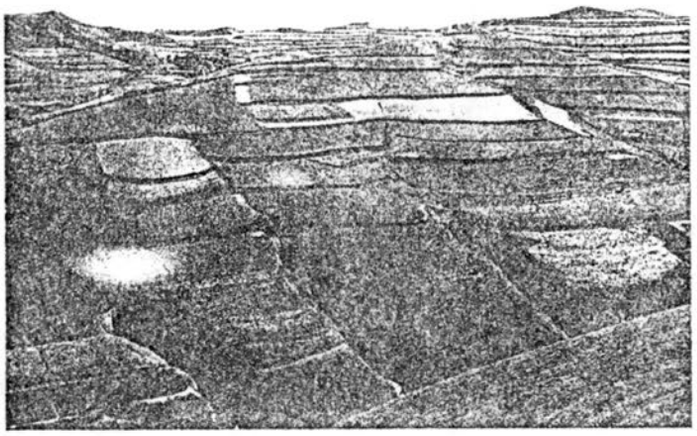
Photos by Walter Clay Lowdermilk

Terrace fields punctuate the valley below a spectacular mountain landscape near Bechare in Algeria, North Africa, circa 1938.



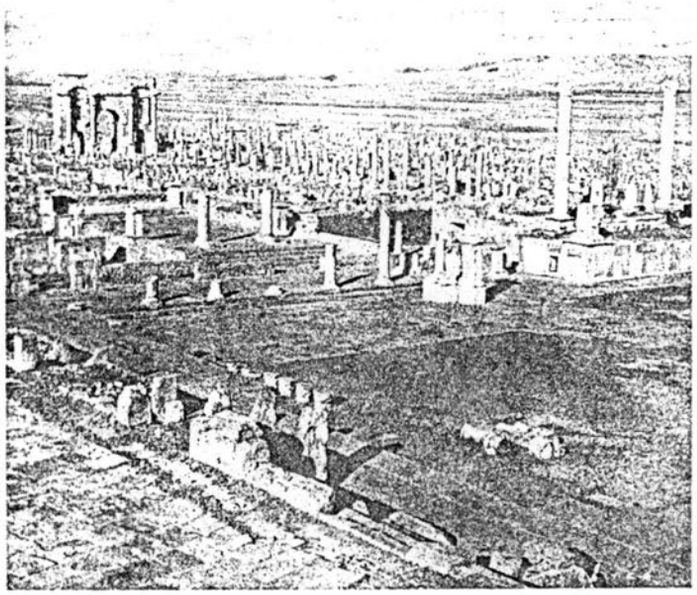
One of four small groves of cedar trees remaining in Lebanon in the late 1930s. The stone fence protected the area from grazing goats.







Sand dunes near d'Arcachon, France. Where uncontrolled, the dunes were advancing inland at a rate of 60 to 65 feet per year.



Benched slopes between Tsining and Hwa Chia Ling in China (middle). Note the gullies, which follow farm boundaries.

Timgad, North Africa (above) once a glory of Rome, lay in deserted ruin in 1939, surrounded by a desolate countryside.

A1.75 : 99/2

Conquest of the Land Through 7,000 Years



Agriculture Information Bulletin No. 99
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

PREFACE

"Conquest of the Land through 7,000 Years" is Dr. Lowdermilk's personal report of a study he made in 1938 and 1939. Despite changes in names of countries, in political boundaries, and in conservation technology, the bulletin still has significance for all peoples concerned with maintaining and improving farm production.

Dr. Lowdermilk studied the record of agriculture in countries where the land had been under cultivation for hundreds, even thousands, of years. His immediate mission was to find out if the experience of these older civilizations could help in solving the serious soil erosion and land use problems in the United States, then struggling with repair of the Dust Bowl and the gullied South.

He discovered that soil erosion, deforestation, overgrazing, neglect, and conflicts between cultivators and herdsmen have helped topple empires and wipe out entire civilizations. At the same time, he learned that careful stewardship of the earth's resources, through terracing, crop rotation, and other soil conservation measures, has enabled other societies to flourish for centuries.

The Soil Conservation Service has reprinted this bulletin without change to meet the continuing demand from teachers, clergymen, writers, college professors, garden clubs, environmental groups, and service organizations for copies of the report as originally written by Dr. Lowdermilk.

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CONQUEST OF THE LAND THROUGH SEVEN THOUSAND YEARS

By W. C. LOWDERMILK, *formerly Assistant Chief, Soil Conservation Service*

Sometime ago I heard of an old man down on a hill farm in the South, who sat on his front porch as a newcomer to the neighborhood passed by. The newcomer to make talk said, "Mister, how does the land lie around here?" The old man replied, "Well—I don't know about the land a-lying; it's these real estate people that do the lying."

In a very real sense the land does not lie; it bears a record of what men write on it. In a larger sense a nation writes its record on the land, and a civilization writes its record on the land—a record that is easy to read by those who understand the simple language of the land. Let us read together some of the records that have been written on the land in the westward course of civilization from the Holy Lands of the Near East to the Pacific coast of our own country through a period of some 7,000 years.

Records of mankind's struggles through the ages to find a lasting adjustment to the land are found written across the landscapes as "westward the course of empire took its way." Failures are more numerous than successes, as told by ruins and wrecks of works along this amazing trail. From these failures and successes we may learn much of profit and benefit to this young Nation of the United States as it occupies a new and bountiful continent and begins to set up house for a thousand or ten thousand years—yea, for a boundless future.

Freedom Bought and Sold for Food

Pearl Harbor, like an earthquake, shocked the American people to a realization that we are living in a dangerous world—dangerous for our way of life and for our survival as a people, and perilous for the hope of the ages in a government of the people, by the people, and for the people. Why should the world be dangerous for such a philanthropic country as ours?

The world is made dangerous by the desperation of peoples suffering from privations and fear of privations, brought on by restrictions of the exchange of the good and necessary things of Mother Earth. Industrialization has wrought in the past century far-reaching changes in civilization, such as will go on and on into our unknown future.

Raw materials for modern industry are localized here and there over the globe. They are not equally available to national groups of peoples who have learned to make and use machines. Wants and needs of food and raw materials have been growing up unevenly and bringing on stresses and strains in international relations that are seized upon by ambitious peoples and leaders to control by force the sources of such food and raw materials. Wars of aggression, long and well-planned, take place so that such materials can be obtained.

These conflicts are not settled for good by war. The problems are pushed aside for a time only to come back in more terrifying proportions at some later time. Lasting solutions will come in another way. We can depend on the reluctance of peoples to launch themselves into war, for they go to war because they fear something worse than war, either real or propagandized.

A just relation of peoples to the earth rests not on exploitation, but rather on

conservation—not on the dissipation of resources, but rather on restoration of the productive powers of the land and on access to food and raw materials. If civilization is to avoid a long decline, like the one that has blighted North Africa and the Near East for 13 centuries, society must be born again out of an economy of exploitation into an economy of conservation.

We are now getting down to fundamentals in this relationship of a people to the land. My experience with famines in China taught me that in the last reckoning all things are purchased with food. This is a hard saying; but the recent world-wide war shows up the terrific reach of this fateful and awful truth. Aggressor nations used the rationing of food to subjugate rebellious peoples of occupied countries. For even you and I will sell our liberty and more for food, when driven to this tragic choice. There is no substitute for food.

Seeing what we will give up for food, let us look at what food will buy—for money is merely a symbol, a convenience in the exchange of the goods and services that we need and want. Food buys our division of labor that begets our civilization.

Not until tillers of soil grew more food than they themselves required were their fellows released to do other tasks than the growing of food—that is, to take part in a division of labor that became more complex with the advance of civilization.

True, we have need of clothing, of shelter, and of other goods and services made possible by a complex division of labor, founded on this food production, when suitable raw materials are at hand. And of these the genius of the American people has given us more than any other nation ever possessed. They comprise our American standard of living. But these other good things matter little to hungry people as I have seen in the terrible scourges of famine.

Food comes from the earth. The land with its waters gives us nourishment. The earth rewards richly the knowing and diligent but punishes inexorably the ignorant and slothful. This partnership of land and farmer is the rock foundation of our complex social structure.

In 1938, in the interests of a permanent agriculture and of the conservation of our land resources, the Department of Agriculture asked me to make a survey of land use in olden countries for the benefit of our farmers and stockmen and other agriculturists in this country. This survey took us through England, Holland, France, Italy, North Africa, and the Near East. After 18 months it was interrupted by the outbreak of war when Germany invaded Poland in September 1939. We were prevented from continuing the survey through Turkey, the Balkan States, southern Germany, and Switzerland as was originally planned. But in a year and a half in the olden lands we discovered many things of wide interest to the people of America.

Graveyard of Empires

We shall begin our reading of the record as it is written on the land in the Near East. Here, civilization arose out of the mysteries of the stone age and gave rise to cultures that moved eastward to China and westward through Europe and across the Atlantic Ocean to the Americas.

We are daily and hourly reminded of our debt to the Sumerian peoples of Mesopotamia whenever we use the wheel that they invented more than 6,000 years ago. We do homage to their mathematics each time we look at the clock or our watches to tell time divided into units of 60.

Moreover, our calendar in use today is a revision of the method the ancient Egyptians used in dividing the year. We inherit the experience and knowledge of the past more than we know.

Agriculture had its beginning at least 7,000 years ago and developed in two great centers—the fertile alluvial plains of Mesopotamia and the Valley of the Nile. We shall leave the interesting question of the precise area in which agriculture originated to the archaeologists.

It is enough for us to know that it was in these alluvial plains in an arid climate that tillers of soil began to grow food crops by irrigation in quantities greater than their own needs. This released their fellows for a division of labor that gave rise to what we call civilization. We shall follow the vicissitudes of peoples recorded on the land, as nations rose and fell in these fateful lands.

A survey of such an extensive area in the short time of 2 years called for simple but fundamental methods of field study. With the aid of agricultural officials of other countries, we hunted out fields that had been cultivated for a thousand years—the basis of a permanent agriculture. Likewise, we tried to find the reasons why lands formerly cultivated had been wasted or destroyed, as a warning to our farmers and our city folks of a possible similar catastrophe in this new land of America. A simplified method of field study enabled us to examine large areas rapidly.

In the Zagros Mountains that separate Persia from Mesopotamia, shepherds with their flocks have lived from time immemorial, when "the memory of man runneth not to the contrary." From time to time they have swept down into the plain to bring devastation and destruction upon farming and city peoples of the plains. Such was the beginning of the Cain and Abel struggle between the shepherd and the farmer, of which we shall have more to say.

At Kish, we looked upon the first capital after the Great Flood that swept over Mesopotamia in prehistoric times and left its record in a thick deposit of brown alluvium. The layer of alluvium marked a break in the sequence of a former and a succeeding culture, as recorded in artifacts. Above the alluvium deposits is the site of Kish (fig. 1).

At the ruins of mighty Babylon we pondered the ruins of Nebuchadnezzar's stables (fig. 2), adorned by animal figures in bas-relief. We stood subdued as though at a funeral as we recalled how this great ruler of Babylon had boasted:



FIGURE 1.—Ruins of Kish, one of the world's most important cities 6,000 years ago. Recently, archaeologists excavated these ruins from beneath the desert sands of Mesopotamia.

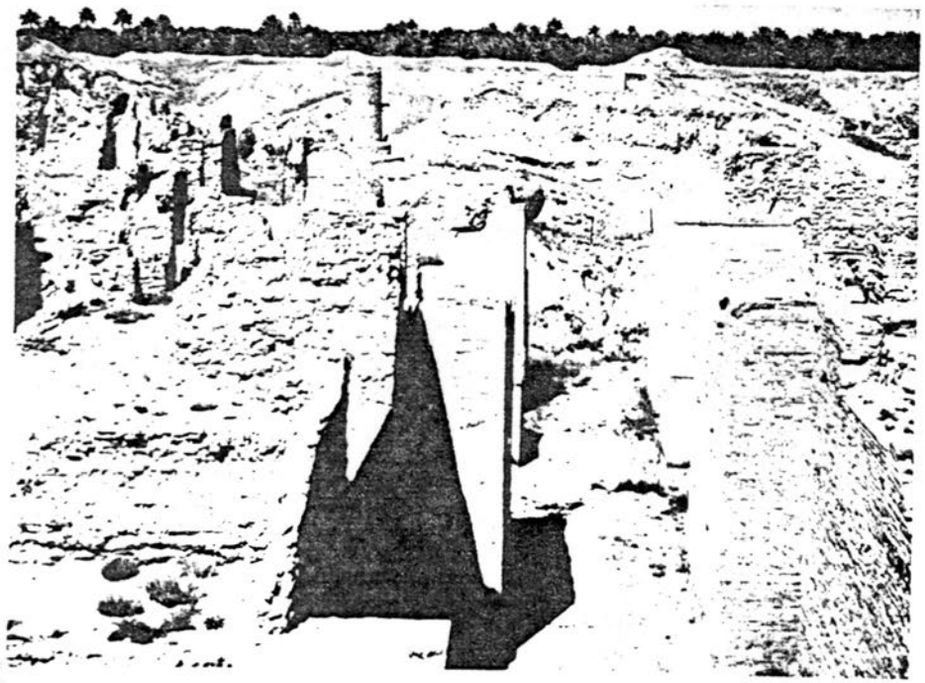


FIGURE 2.—Ruins of the famous stables of Nebuchadnezzar in Babylon built during the sixth century B. C. Babylon died and was buried by the desert sands, not because it was sacked and razed but because the irrigation canals that watered the land that supported the city were permitted to fill with silt.

That which no king before had done, I did . . . A wall like a mountain that cannot be moved, I builded . . . great canals I dug and lined them with burnt brick laid in bitumen and brought abundant waters to all the people . . . I paved the streets of Babylon with stone from the mountains . . . magnificent palaces and temples I have built . . . Huge cedars from Mount Lebanon I cut down . . . with radiant gold I overlaid them and with jewels I adorned them.

Then came to mind the warnings of the Hebrew prophets that were thundered against the wicked city. They warned that Babylon would become "A desolation, a dry land, and a wilderness, a land wherein no man dwelleth . . . And wolves shall cry in their castles, and jackals in the pleasant places." Believe it or not, the only living thing that we saw in this desolation that once was Babylon was a lean gray wolf, shaking his head as if he might have a tick in his ear, as he loped to his lair in the ruins of one of the seven wonders of the ancient world—the Hanging Gardens of Babylon where air conditioning was in use 2,600 years ago.

Mesopotamia, the traditional site of the Garden of Eden, out of which come the stories of the Flood, of Noah and the Ark, of the "Tower of Babel" and the confusion of tongues, of the fiery furnace which we found still burning today, is jotted full of records of a glorious past, of dense populations, and of great cities that are now ruins and desolation. For at least 11 empires have risen and fallen in this tragic land in 7,000 years. It is a story of a precarious agriculture practiced by people who lived and grew up under the threat of raids and invasions from the denizens of grasslands and the desert, and of the failure of their irrigation canals because of silt.

Agriculture was practiced in a very

dry climate by canal irrigation with muddy water from the Tigris and Euphrates Rivers. This muddy water was the undoing of empire after empire. As muddy river waters slowed down, they choked up the canals with silt. It was necessary to keep this silt out of the canals year after year to supply life-giving waters to farm lands and to cities of the plain.

As populations grew, canals were dug farther and farther from the rivers. This great system of canals called for a great force of hand labor to keep them clean of silt. The rulers of Babylon brought in war captives for this task. Now we understand why the captive Israelites "sat down by the waters of Babylon and wept." They also were, doubtless, required to dig silt out of canals of Mesopotamia.

As these great public works of cleaning silt out of canals were interrupted from time to time by internal revolutions and by foreign invaders, the peoples of Mesopotamia were brought face to face with disaster in canals choked with silt. Stoppage of canals by silt depopulated villages and cities more effectively than the slaughter of people by an invading army.

On the basis of an estimate that it was possible in times past to irrigate 21,000 of the 35,000 square miles of the alluvium of Mesopotamia, the population of Mesopotamia at its zenith was probably between 17 and 25 million. The present population of all Iraq is estimated to be about 4 million, including nomadic peoples. Of this total, not more than 3½ million live on the alluvial plain.

Decline in population in Mesopotamia is not due to loss of soil by erosion. The fertile lands are still in place and life-giving waters still flow in the Tigris and Euphrates Rivers, ready to be spread upon the lands today as in times past. Mesopotamia is capable of supporting as great a population as it ever did and greater when modern engineering makes use of reinforced concrete construction for irrigation works and powered machinery to keep canal systems open.

A greater area of Mesopotamia thus might be farmed than ever before in the long history of this tragic land. But erosion in the hinterlands aggravated the silt problem in waters of the Tigris and Euphrates Rivers, as they were drawn off into the ancient canal systems. Invasions of nomads out of the grasslands and the desert brought about the breakdown of irrigation that spelled disaster after disaster.

In Egypt's Land

Let's now turn to the other great center of population growth and development of civilization in the Valley of the Nile. Here, the mysterious Sphinx ponders problems of the ages as he looks out over the narrow green Valley of the Nile, lying across a brown and sun-scorched desert.

In Egypt as well as in Mesopotamia, tillers of soil learned early to sow food plants of wheat and barley and to grow surplus food that released their fellows for divisions of labor, giving rise to the remarkable civilization that arose in the Valley of the Nile. Our debt to the ancient Egyptians is great.

Here, too, farming grew up by flood irrigation with muddy waters. But the problems of farming were very different from those of Mesopotamia. Annual flooding with silt-laden waters spread thin layers of silt over the land, raising it higher and higher. In these flat lands of slowly accumulating soil, farmers never met with problems of soil erosion.

To be sure, there have been problems of salt accumulation and of rising water tables for which drainage is the solution. This is especially true since yearlong irrigation has been made possible by the Assuan Dam. But the body of the soil has remained suitable for cropping for 6,000 years and more.

It was perhaps in the Valley of the Nile that a genius of a farmer about 6,000 years ago hitched an ox to a hoe and invented the plow, thus originating power-farming to disturb the social structure of those times much as the tractor disturbed the social structure of

our country in recent years. By this means farmers became more efficient in growing food; a single farmer released several of his fellows from the vital task of growing food for other tasks. Very likely the Pharaohs had difficulty in keeping this surplus population sufficiently occupied. For we suspect that the Pyramids were the first WPA projects.

On the Trail of the Israelites

We shall follow the route of Moses out of the fertile, irrigated lands of Egypt into a mountainous land where forests and fields were watered with the rain of Heaven. Fields cleared on mountain slopes presented a new problem in farming—the problem of soil erosion, which, as we shall see, became the greatest hazard to permanent agriculture and an insidious enemy of civilization.

We crossed the modern Suez Canal with its weird color of blue into Sinai where the Israelites with their herds wandered for 40 years. They or someone must have overgrazed the Peninsula of Sinai, for it is now a picture of desolation. We saw in this landscape how the original brown soil mantle was eroded into enormous gullies as shown by great yellowish gashes cut into the brown soil covering. I had not expected to find evidences of so much accelerated erosion in the arid land of Sinai.

On the way to Aqaba we crossed a remarkable landscape, a plateau that had been eroded through the ages almost to a plain, called a peneplain in physiographic language.

This peneplain surface dates back to Miocene times, in the geological scale. In the plain now there is no evidence of accelerated cutting by torrential streams and no evidence that climate has changed for drier or wetter conditions since Miocene times. Here is a cumulative record going far back of the ice age, proclaiming that in this region climate has been remarkably stable.

From this plateau we dropped down 2,500 feet into the Araba or gorge of the great rift valley that includes the Gulf of Aqaba, the Araba, the Dead Sea, and the Valley of the Jordan. At the head of the Gulf of Aqaba of the Red Sea we found Dr. Nelson Glueck excavating Ezion Geber which he calls the ancient Pittsburg of the Red Sea, or Solomon's Seaport. Here, copper was smelted 2,800 years ago to furnish instruments for Solomon and his people. The mud brick used for building these ancient houses looked just like our adobe brick of New Mexico and Arizona.

As we climbed out of the rift valley over the east wall to the plateau of Trans-Jordan that slopes toward the Arabian Desert, we came near Amman upon the same type of peneplain that we crossed west of the Araba. Topographically, these two plains are parts of the same peneplain that once spread unbroken across this region. But toward the end of Pliocene times—that is, just before the beginning of the ice age—a series of parallel faults let down into it the great rift valley to form one of the most spectacular examples of disturbances in the earth's crust that is known to geologists.

From Ma'an we proceeded past an old Roman dam, silted up and later washed out and left isolated as a meaningless wall. At Elji we took horses to visit the fantastic ruins of ancient Petra (called Sela in the Old Testament). This much-discussed city was the capital of the Nabatean civilization and flourished at the same time as the Golden Age of China—200 B. C. to A. D. 200. Rose-red ruins of a great city are hidden away in a desert gorge on the margin of the Arabian Desert.

Petra is now the desolate ruin of a great center of power and culture. It has been used by some students as evidence that climate has become drier in the past 2,000 years, making it impossible for this land to support as great a population as it did in the past. In contradiction to this conclusion, we found slopes of the surrounding valley covered with terrace walls that had fallen into ruin and allowed the soils to be washed off to bare rock over large areas. These evi-

dences showed that food had been grown locally and that soil erosion had damaged the land beyond use for crops.

Invasion of nomads out of the desert had probably resulted in a breakdown in these measures for the conservation of soil and water. Also, erosion had washed away the soils from the slopes and undermined the carrying capacity of this land for a human population. Before ascribing decadence of the region to change of climate, we must know how much the breakdown of intensive agriculture contributed to the fall and disappearance of this Nabatean civilization.

The great buildings used for public purposes are amazing. Temples, administrative buildings, and tombs are all carved out of the red Nubian sandstone cliffs. A fascinating story still lies hidden in the unexcavated ruins of this ancient capital. The influence of Greek and Roman civilization was found in a great theater with a capacity to seat some 2,500 persons. It was carved entirely out of massive sandstone rock that now only echoes the scream of eagles, or the chatter of tourists.

And as we proceeded northward in the Biblical land of Moab, we came to the site of Mt. Nebo. We were reminded of how Moses, after having led the Israelites through 40 years of wandering in the wilderness, stood on this mountain and looked across the Jordan Valley to the Promised Land. He described it to his followers in words like these:

> For the Lord thy God bringeth thee into a good land, a land of brooks of water, of fountains and depths that spring out of valleys and hills; a land of wheat and barley and vines and fig trees and pomegranates, a land of olive oil and honey; a land wherein thou shalt eat bread without scarceness; thou shalt not lack anything in it; a land whose stones are iron and out of whose hills thou mayest dig brass.

The Land of Milk and Honey

We crossed the Jordan Valley as did Joshua and found the Jordan River a muddy and disappointing stream. We stopped at the ruins of Jericho and dug out kernels of charred grain which the archaeologists tell us undoubtedly belonged to an ancient household of this ill-fated city. We looked at the Promised Land as it is today, 3,000 years after Moses described it to the Israelites as a "land flowing with milk and honey."

We found the soils of red earth washed off the slopes to bedrock over more than half the upland area. These soils had lodged in the valleys where they are still being cultivated and are still being eroded by great gullies that cut through the alluvium with every heavy rain. Evidence of rocks washed off the hills were found in piles of stone where tillers of soil had heaped them together to make cultivation about them easier. From the air we read with startling vividness the graphic story as written on the land. Soils had been washed off to bedrock in the vicinity of Hebron and only dregs of the land were left behind in narrow valley floors, still cultivated to meager crops.

In the denuded highlands of Judea are ruins of abandoned village sites. Capt. P. L. O. Guy, director of the British School of Archaeology, has studied in detail those sites found in the drainage of Wadi Musrara that were occupied 1,500 years ago. Since that time they have been depopulated and abandoned in greater numbers on the upper slopes.

Captain Guy divided the drainage of Musrara into 3 altitudinal zones: The plain, 0–325 feet; foothills, 325–975 feet; and mountains, 975 feet and over. In the plain, 34 sites were occupied and 4 abandoned; in the foothills, 31 occupied and 65 abandoned; and in the mountains, 37 occupied and 124 abandoned. In other words, villages have thus been abandoned in the 3 zones in percentages in the above order of 11, 68, and 77, which agrees well with the removal of soil.

It is little wonder that villages were abandoned in a landscape such as this in the upper zone near Jerusalem. The soil, the source of food supply, has been wasted away by erosion. Only remnants of the land left in drainage channels are held there by cross walls of stone.



FIGURE 3.—This is a present-day view of a part of the Promised Land to which Moses led the Israelites about 1200 B. C. A few patches still have enough soil to raise a meager crop of barley. But most of the land has lost practically all of its soil, as observed from the rock outcroppings. The crude rock terrace in the foreground helps hold some of the remaining soil in place.

Where soils are held in place by stone terrace walls, that have been maintained down to the present, the soils are still cultivated after several thousand years. They are still producing, but not heavily, to be sure, because of poor soil management (fig. 3).

Most important, the soils are still in place and will grow bigger crops with improved soil treatment. The glaring hills of Judea, not far from Jerusalem, are dotted with only a few of their former villages. Terraces on these hills have been kept in repair for more than 2,000 years.

What is the cause of the decadence of this country that was once flowing with milk and honey? As we ponder the tragic history of the Holy Lands, we are reminded of the struggle of Cain and Abel. This struggle has been made realistic through the ages by the conflict that persists, even unto today, between the tent dweller and the house dweller, between the shepherd and the farmer.

The desert seems to have produced more people than it could feed. From time to time the desert people swept down into the fertile alluvial valleys where, by irrigation, tillers of soil grew abundant foods to support teeming villages and thriving cities.

They swept down as a wolf on the fold to raid the farmers' supplies of food. Raiders sacked and robbed and passed on. Often, they left destruction and carnage in their path, or they replaced former populations and became farmers themselves, only to be swept out by a later wave of hungry denizens of the desert.

Conflicts between the grazing and farming cultures of the Holy Lands have been primarily responsible for the tragic history of this region. Not until these two cultures supplement each other in

cooperation can we hope for peace in this ancient land.

We saw the tents of descendants of nomads out of Arabia. In the seventh century they swept in out of the desert to conquer and overrun the farming lands of Palestine. Again in the 12th century nomads drove out the Crusaders. They with their herds of long-eared goats let terrace walls fall in ruin and unleashed the forces of erosion. For nearly 13 centuries erosion has been washing the soils off the slopes into the valleys to make marshes or out to sea.

In recent times a great movement has been under way for the redemption of the Promised Land by Jewish settlers. They have wrought wonders in draining swamps, ridding them of malaria, and planting them to thriving orchards and fields. These settlers have also repaired terraces, reforested desolate and rocky slopes, and improved livestock and poultry.

Throughout our survey of the work of the agricultural colonies, I was asked to advise on measures to conserve soil and water. I urged that orchards be planted on the contour and the land bench-terraced by contour plowing. We were shown one orchard where the trees were planted on the contour, the land was bench-terraced, and slopes above the orchard were furrowed on the contour and planted to hardy trees.

By these measures all the rain that had fallen the season before, one of the wettest in many years, had been absorbed by the soil. After this work was done, no runoff occurred to cut gullies down slope and to damage the orchards below. We were told that the man responsible for this had learned these measures at the Institute of Water Economy in Tiflis, Georgia, in Transcaucasia.

Across Syria

We crossed the Jordan again into a region famous in Biblical times for its oaks, wheat fields, and well-nourished herds. We found the ruins of Jerash, one of the 10 cities of the Decapolis, and Jerash the second. Archaeologists tell us that Jerash was once the center of some 250,000 people. But today only a village of 3,000 marks this great center of culture, and the country about it is sparsely populated with seminomads. The ruins of this once-powerful city of Greek and Roman culture are buried to a depth of 13 feet with erosional debris washed from eroding slopes.

We searched out the sources of water that nourished Jerash and found a series of springs protected by masonry built in the Graeco-Roman times. We examined these springs carefully with the archaeologists to discover whether the present water level had changed with respect to the original structures and whether the openings through which the springs gushed were the same as those of ancient times. We found no suggestion that the water level was any lower than it was when the structures were built or that the openings were different. It seems that the water supply had not failed.

When we examined the slopes surrounding Jerash we found the soils washed off to bedrock in spite of rock-walled terraces. The soils washed off the slopes had lodged in the valleys. These valleys were cultivated by the seminomads who lived in black goat-hair tents. In Roman times this area supplied grain to Rome and supported thriving communities and rich villas, ruins of which we found in the vicinity.

In the alluvial plains along the Orontes River, agriculture supports a number of cities, much reduced in population from those of ancient times. Water wheels introduced from Persia during or following the conquests of Alexander the Great (300 B. C.) were numerous along the Orontes. There were hundreds, we were told, in Roman times, but today only 44 remain. They are picturesque old structures both in their appearance and in the groans of the turning wheel as they slowly lift water from the river to the aqueduct to supply water for the city of Hama. These wheels are more than 2,000 years old. But no part of a wheel is that old, because the parts have been

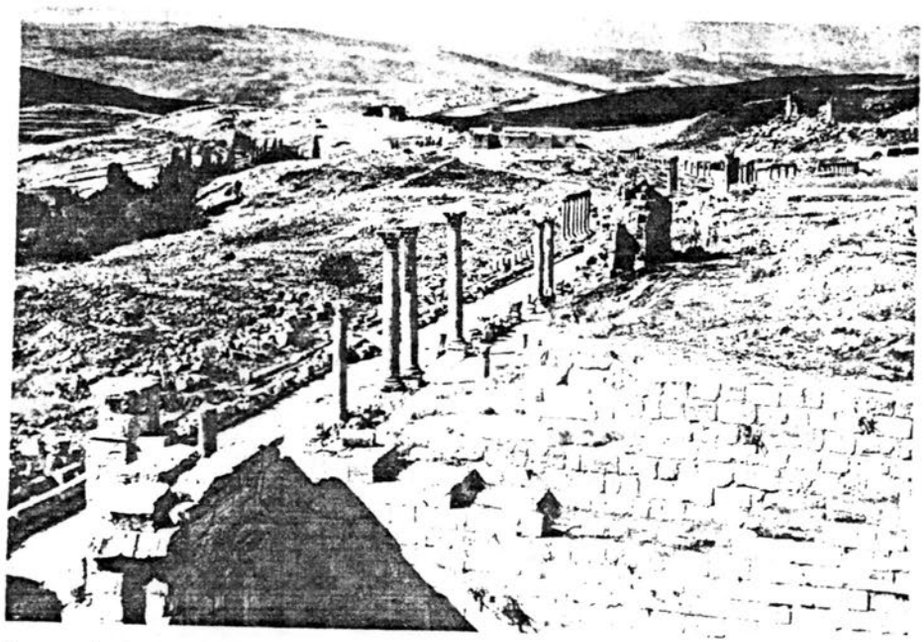


FIGURE 4.—Ruins of one of the Hundred Dead Cities of Syria. From 3 to 6 feet of soil has been washed off most of the hillsides. This city will remain dead because the land around it can no longer support a city.

replaced piecemeal many times through the centuries.

The Hundred Dead Cities

Still farther to the north in Syria, we came upon a region where erosion had done its worst in an area of more than a million acres of rolling limestone country between Hama, Alleppo, and Antioch. French archaeologists, Father Mattern, and others found in this man-made desert more than 100 dead cities.

Butler of Princeton rediscovered this region a generation ago. These were not cities as we know them, but villages and market towns. The ruins of these towns were not buried. They were left as stark skeletons in beautifully cut stone, standing high on bare rock (fig. 4). Here, erosion had done its worst. If the soils had remained, even though the cities were destroyed and the populations dispersed, the area might be repeopled again and the cities rebuilt. But now that the soils are gone, all is gone.

We are told that in A. D. 610–612 a Persian army invaded this thriving region. Less than a generation later, in 633–638, the nomads out of the Arabian Desert completed the destruction of the villages and dispersal of the population. Thus, all the measures for conserving soil and water that had been built up through centuries were allowed to fall into disuse and ruin. Then erosion was unleashed to do its deadly work in making this area a man-made desert.

Looking for the Forests of Lebanon

About 4,500 years ago, we are told by archaeologists, a Semitic tribe swept in out of the desert and occupied the eastern shore of the Mediterranean and established the harbor towns of Tyre and Sidon. On the site of another such ancient harbor town is Beirut, which today is the capital of Lebanon. You can see it from a high point on the Lebanon Mountains overlooking the Mediterranean Sea.

These early Semites were Phoenicians. They found their land a mountainous country with a very narrow coastal plain and little flat land on which to carry out the traditional irrigated agriculture as it had grown up in Mesopotamia and Egypt. We may believe that as the Phoenician people increased, they were confronted with three choices: (1) Migration and colonization, which we know they did; (2) manufacturing and commerce, which we know they did; and (3) cultivation of slopes, about which we have hitherto heard little.

Here was a land covered with forests and watered by the rains of heaven, a land that held entirely new problems for tillers of soil who were accustomed to the flat alluvial valleys of Mesopotamia and the Nile. As forests were cleared either for domestic use or for commerce, slopes were cultivated. Soils of the slopes eroded then under heavy winter rains as they would now. Here under rain farming, they encountered severe soil erosion and the problem of establishing a permanent agriculture on sloping lands.

We find, as we read the record on the land in this fascinating region, tragedy after tragedy deeply engraved on the sloping land. To control erosion walls were constructed across the slopes. Ruins of these walls can be seen here and there today. These measures failed, and erosion caused the soil to shift down slope. As the fine-textured soil was washed away, leaving loose rocks at the surface, tillers of the soil piled the rocks together to make cultivation about them easier. In these cases the battle with soil erosion was definitely a losing one.

Elsewhere we found that the battle with soil erosion had been won by the construction and maintenance of a remarkable series of rock-walled terraces extending from the bases to the crests of



FIGURE 5.—Rock-walled bench terraces in Lebanon that have been in use for thousands of years. The construction of terraces of this type would cost from $2,000 to $5,000 per acre if labor was figured at 40 cents per hour. Such expensive methods of protecting land are practical only where people have no other land on which to raise their food.

slopes like fantastic staircases (fig. 5). At Beit Eddine in the mountains of Lebanon east of Beirut, we found the slopes terraced even up to grades of 76 percent.

The mountains of ancient Phoenicia were once covered by the famous forests, the cedars of Lebanon. An inscription on the temple of Karnak, as translated by Breasted, announces the arrival in Egypt before 2900 B. C. of 40 ships ladden with timber out of Lebanon.

You will recall that it was King Solomon, nearly 3,000 years ago, who made an agreement with Hiram, King of Tyre, to furnish him cypress and cedars out of these forests for the construction of the temple at Jerusalem. Solomon supplied 80,000 lumberjacks to work in the forest and 70,000 to skid the logs to the sea. It must have been a heavy forest to require such a force. What has become of this famous forest that once covered nearly 2,000 square miles?

Today, only 4 small groves of this famous Lebanon cedar forest are left, the most important of which is the Tripoli grove of trees in the cup of a valley. An examination of the grove revealed some 400 trees of which 43 are old veterans or wolf trees. As we read the story written in tree rings, it appears that about 300 years ago the grove had nearly disappeared with no less than 43 scattered veteran trees standing.

These trees with wide-spreading branches had grown up in an open stand. About that time a little church was built in their midst that made the grove sacred. A stone wall was built about the grove to keep out the goats that grazed over the mountains. Seeds from the veteran trees fell to the ground, germinated, and grew up into a fine close-growing stand of tall straight trees that show how the cedars of Lebanon will make good construction timber when grown in forest conditions (fig. 6).



FIGURE 6.—Cedars still grow in Lebanon when given a chance. This is part of one of the four small groves that still exist. It is in the grounds of a monastery and is protected from goat grazing by the stone fence.



FIGURE 7.—These bench terraces in Shansi Province illustrate the extent to which some Chinese farmers have gone to conserve the remaining soil on their hillsides.

Such natural restocking also shows that this famous forest has not disappeared because of adverse change of climate, but that under the present climate it would extend itself if it were safeguarded against the rapacious goats that graze down every accessible living plant on these mountains.

China's Sorrow

Before moving on to Cyprus and North Africa, let's look at China. Civilization here probably arose somewhat later than that in the Near East and was influenced by it. Mixed agriculture, irrigation, the oxdrawn plow, and terracing of slopes are notable similarities in the two regions (fig. 7).

It was in China, where I was engaged in an international project for famine prevention in 1922–27, that the full and fateful significance of soil erosion was first burned into my consciousness.

During an agricultural exploration into the regions of North China, seriously affected by the famine of 1920–21, I examined the site where the Yellow River, in 1852, broke from its enormous system of inner and outer dikes. As we traveled across the flat plains of Honan, we saw a great flat-topped hill looming up before us. We traveled on over the elevated plain for 7 miles to another great dike that stretched across the landscape from horizon to horizon. We mounted this dike and there before us lay the Yellow River, the Hwang Ho, a great width of brown water flowing quietly that spring morning into a tawny haze in the east.

Here in a channel fully 40 to 50 feet above the plain of the great delta lay the river known for thousands of years as "China's Sorrow." This gigantic river had been lifted up off the plain over the entire 400-mile course across its delta and had been held in this channel by

hand labor of men—without machines or engines, without steel cables or construction timber, and without stone.

Millions of Chinese farmers with bare hands and baskets had built here through thousands of years a stupendous monument to human cooperation and the will to survive. Since the days of Ta-Yu, nearly 4,000 years ago, the battle of floods with this tremendous river have been lost and won time and again.

But why should this battle with the river have to be endless? Any relaxation of vigilance let the river break over its dikes, calling for herculean and cooperative work to put the river back again in its channel. Then suddenly it dawned upon me that the river was brown with silt, heavily laden with soil that was washed out of the highlands of the vast drainage system of the Yellow River.

As its flood waters reached the gentler slope of the delta (1 foot to the mile), the current slowed down and began to drop its load of silt. Deposits of silt in turn lessened the capacity of the channel to carry floodwaters and called on the farmers threatened with angry floods to build up the dikes yet higher and higher, year after year.

There was no end to this demand of the river if it were to be confined between its dikes. Final control of the river so heavily laden with silt was hopeless; yet millions of farmers toiled on.

In 1852, the yellow-brown waters of the Hwang Ho broke out of its elevated channel to seek another way to the sea. It had emptied into the Yellow Sea, where it had usurped the old outlet of the Shai River.

This time the river broke over its dikes near Kaifeng, Honan, and wandered to the northeast over farm lands, destroying villages and smothering the life out of millions of humans, and discharged into the Gulf of Chihli, 400 miles north of its former outlet. In its rage it had refused to be lifted any higher off its plain. Hundreds of thousands of farmers had been defeated. Silt had defeated them, valiant as they were.

Silt — silt — silt! We determined to learn where this silt came from, even up to the headwaters.

In a series of carefully planned agricultural explorations we discovered the source of the silt that brought ruin to millions of farmers in the plains. In the Province of Shansi we found how the line of cultivation was pushed up slopes, following the clearing away of forests. Soils, formerly protected by a forest mantle, were thus exposed to summer rains, and soil erosion began a headlong process of destroying land and filling streams with soil waste and detritus.

Without a basis of comparison, we might easily have misread the record as written there on the land. But temple forests, preserved and protected by the Buddhist priests, gave me and my Chinese associates a remarkable chance to measure and compare rates of erosion within these forests and on similar slopes and soils that had been cleared and cultivated.

In brief, my Chinese scientific associates[1] and I carried out a series of soil-erosion experiments during rainy seasons of 3 years. In these experiments we measured the rate of runoff and erosion by means of runoff plots within temple forests, out on farm fields under cultivation, and on fields abandoned because of erosion. For the first time in soil-erosion studies, we got experimental data for such comparisons. Here too, we found how the Yellow River had become China's Sorrow, for we found that runoff and erosion from cultivated land were many times as great as from temple forests.

It was clear that if the farmers of the delta plain were ever to be safeguarded from the mounting perils of the silt-laden Yellow River, the source of the silt must be stopped by erosion control.

Farther west in the midst of the famous and vast loessial deposits of North

[1] T. I. Li, C. T. Ren, C. O. Lee, and others. See Proceedings of the Pan-Pacific Science Congress, Tokyo. 1926.

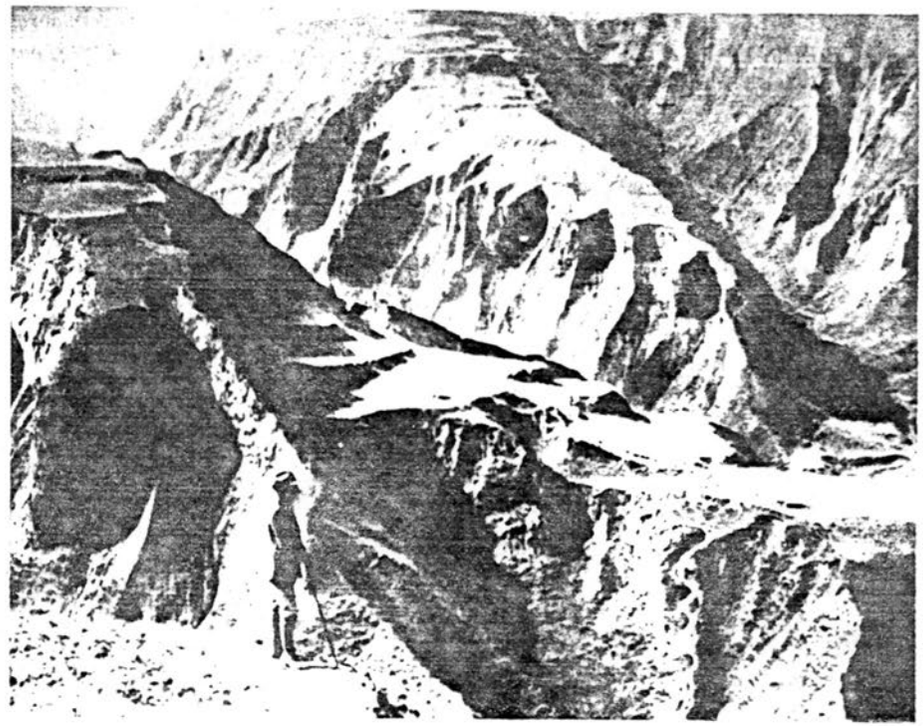


FIGURE 8.—These huge gullies indicate the severity of soil erosion in the deep, and once fertile, loessial soils of northern China. Millions of acres have been cut up like this and are now almost worthless.

China, we found in the Province of Shansi that an irrigation system first established in 246 B. C. had been put out of use by silt. Here again silt was the villain.

We sought out the origin of the silt that had brought an end to an irrigation project that had fed the sons of Han during the Golden Age of China. This origin was found in areas where soil erosion had eaten out gullies 600 feet deep (fig. 8). It was while contemplating such scenes that I resolved to challenge the conclusions of the great German geologist, Baron Von Richthofen, and of Ellsworth Huntington that the decadence of North China was due to desiccation or pulsations of the climate.

Temple forests gave the clue. They demonstrated beyond a doubt that the present climate would support a generous growth of vegetation capable of preventing erosion on such a scale. Human occupation of the land had set in motion processes of soil wastage that were in themselves sufficient to account for the decadence and decline of this part of China, without adverse change of climate.

It was in the presence of such tragic scenes on a gigantic scale that I resolved to run down the nature of soil erosion and to devote my lifetime to study of ways to conserve the lands on which mankind depends.

Soil Waste in Ancient Cyprus

Let's now go back and follow the westward course of civilization from the Holy Lands through North Africa and on into Europe. In Cyprus we found the land use problems of the Mediterranean

epitomized in a comparatively small area.

In the plain of Mesaoria is a telling record in and about a Byzantine church. The church on the outskirts of the village of Asha in eastern Cyprus is surrounded by a graveyard and its wall. The alluvial plain now stands 8 feet above the level of the churchyard as we measured it. On entering the church we stepped down 3 feet from the yard level to the floor of the church. Inside we noted that low pointed arches were blocked off, and new arches had been cut for doors and windows.

The aged vestryman told us that about 30 years ago a flood from the plain had filled the church with water and left 2 feet of silt on the floor. Rather than clean it out, a new stone floor had been laid over the silt deposit. Thus, 8 plus 3 plus 2 equals 13 feet, the height of the present alluvial plain above the original church floor. From these measurements we concluded that the plain had filled in, not less than 13 feet, with erosional debris washed off the drainage slopes.

Across North Africa

Along the northern coast of Africa into Tunisia and Algeria we read the record of the granary of Rome during the empire—by surveying a cross section from the Mediterranean to the Sahara Desert, from 40 inches of rainfall to 4 inches, from Carthage on the coast to Biskra at the edge of mysterious Sahara.

In Tunisia we found that it rains in the desert of North Africa in wintertime now as it did in the time of Caesar—in 44 B. C. Caesar complained of how a great rainstorm with wind had blown over the tents of his army encampment and flooded the camp. It rained hard enough to produce flash floods in the wadies. At one place muddy water swept across the highway in such volume that we decided to wait for the flash flow to go down before proceeding.

We stood on the site of ancient Carthage, the principal city of North Africa in Phoenician and Roman times—the city that produced Hannibal and became a dangerous rival of Rome. In 146 B. C., at the end of the Third Punic War, Scipio destroyed Carthage, but out of the doomed city he saved 28 volumes of a work on agriculture written by a Carthaginian by the name of Mago.

Mago was recognized by the Greeks and Romans as the foremost authority on agriculture in the Mediterranean area. These works of Mago on agricultural subjects were translated by such Roman writers as Columella, Varro, and Cato. The translations tell us that the traditions of conserving soil and water discovered on the slopes of ancient Phoenicia had been brought there by colonists. We suspect these measures furnished the basis of the great agricultural production that was so important to the Romans during the Empire.

Over a large part of the ancient granary of Rome we found the soil washed off to bedrock and the hills seriously gullied as a result of overgrazing. Most valley floors are still cultivated but are eroding in great gullies fed by accelerated storm runoff from barren slopes. This is in an area that supported many great cities in Roman times.

We found at Djemila the ghosts of Cuicul, a city that once was great and populous and rich but later was covered completely, except for about 3 feet of a single column, by erosion debris washed off the slopes of surrounding hills. For 20 years French archaeologists had been excavating this remarkable Roman City and had unearthed great temples, two great forums, splendid Christian churches, and great warehouses for wheat and olive oil. All this had been buried by erosional debris washed from the eroding slopes above the city. The surrounding slopes, once covered with olive groves, are now cut up with active gullies.

The modern village houses only a few inhabitants. The flat lands are still farmed to grain but the slopes are bare and eroding and wasting away. What is the reason for this astounding decline and ruin?

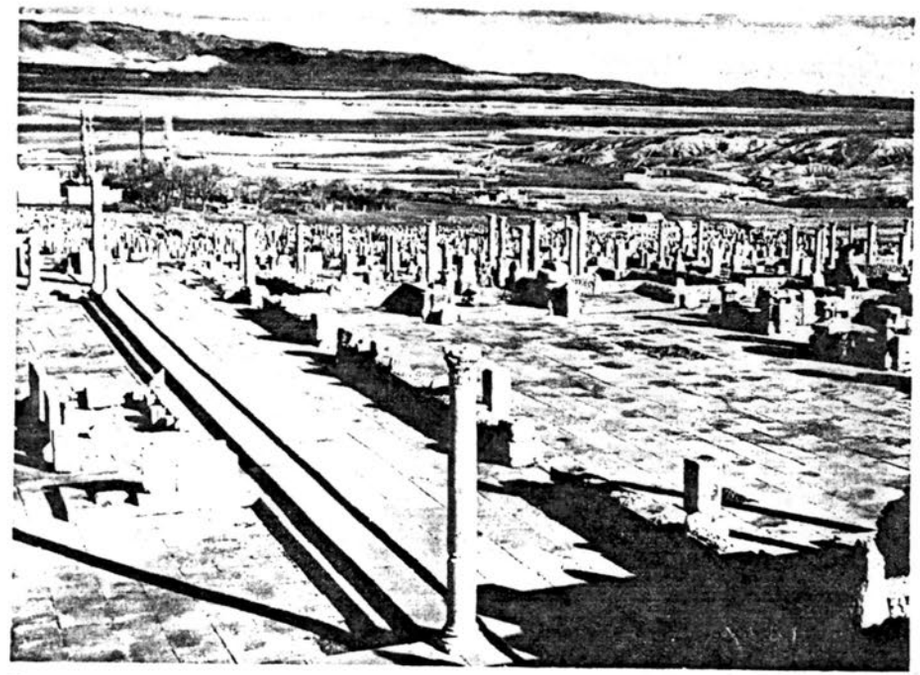


FIGURE 9.—The ruins of Timgad—an ancient Roman city built during the first century A. D. The few huts seen in the center background now house about 300 inhabitants, which is all the eroded land will support. Note that the eroded hills in the background are almost as desolate as the ruins of the city.

Timgad, Lost Capital of a Lost Agriculture

Farther to the south we stopped to study the ruins of another great Roman city of North Africa, Thamugadi, now called Timgad (fig. 9). This city was founded by Trajan in the first century A. D. It was laid out in symmetrical pattern and adorned with magnificent buildings, with a forum embellished by statuary and carved porticoes, a public library, a theater to seat some 2,500 persons, 17 great Roman baths, and marble flush toilets for the public.

After the invasion of the nomads in the seventh century had completed the destruction of the city and dispersal of its population, this great center of Roman culture and power was lost to knowledge for 1,200 years. It was buried by the dust of wind erosion from surrounding farm lands until only a portion of Hadrian's arch and 3 columns remained like tombstones above the undulating mounds to indicate that once a great city was there.

The French Government has been excavating this great center for 30 years. Remarkable examples of building, of art, and of ways of living during Roman times in North Africa have been disclosed, all supported by the agriculture of the Granary of Rome.

But today this great center of power and culture of the Roman Empire is desolation. It is represented by a modern village of only a few hundred inhabitants who live in squalid structures, the walls of which are for the most part built of stone quarried from the ruins of the ancient city. Water erosion has cut a gully down into the land and exposed an ancient aqueduct that supplied water to the city of Timgad from a great spring some 3 miles away.



FIGURE 10.—Ruins of the amphitheater at the former city of Thysdrus, in Tunisia, which would seat 60,000 people. Today, only a few thousand people inhabit this area. The small flock of sheep in the foreground are a fair indication of the land's ability to support life.

Within and surrounding Timgad, we studied remarkable ruins of great olive presses where today there is not a single olive tree within the circle of the horizon.

On the plain of Tunisia we came upon in El Jem the ruins of a great amphitheater, second only in size to that of Rome. (fig. 10). It was built to seat some 60,000 people, but it would be difficult to find 5,000 persons today within this district. The ancient city now lies buried around the amphitheater and a sordid modern village is built on the buried city.

What was the cause of the decadence of North Africa and the decline of its population? Some students have suggested that the climate changed and became drier, forcing people to abandon their remarkable cities and works. But Gsell, the renowned geologist who studied this problem for 40 years, challenged the conclusion that the climate has changed in any important way since Roman times.

So Director Hodet of the Archaeological Excavations at Timgad decided as an experiment to plant olive trees on an unexcavated part of the city where there would be no possibility of subirrigation. He planted young olive trees in the manner prescribed in Roman literature, watering them in the following two long dry summer seasons. These olive trees are thriving, indicating that where soils are still in place, olive trees will grow today probably very much as they did in Roman times.

On the plains about Sfax, ruins of olive presses were found by early travelers, but no olive trees. Forty years ago an experiment to plant olive trees there was decided upon. Now more than 150,000 acres are planted to olive trees; their products support thriving industries in the modern city of Sfax. These plantings indicate that the climate of today has not become significantly drier since Roman times.

Other students of this baffling problem have suggested that pulsations of climate with intervening dry periods, sufficient to blot out the civilization of North Africa, have taken place. Such undoubtedly could have been the case. But at Sousse we found telling evidence on this point in an olive grove that has survived since Roman times. These olive trees were at least 1,500 years old, we were informed.

I was interested in the way these trees were planted—in basins bordered by banks of earth with ways of leading in unabsorbed storm runoff from higher ground. We passed along this area at a time of heavy rains which showed just how this method had worked since the trees were first planted. If there have been pulsations of climate since Roman times, this grove should show that the drier periods were not sufficiently severe to kill the olive trees. We conclude that it does not seem probable that either a progressive change of climate or pulsations of climate account for the decadence of North Africa. We must seek other causes.

On hillsides between Constantine and Timgad, we found on the land a record that indicates what has happened to soils of the granary of ancient Rome. We found some hills that, according to the botanists, were covered with savannah vegetation of scattered trees and grass. Vegetation had conserved a layer of soil on these hills for unknown ages.

With the coming of a grazing culture, brought in by invading nomads of Arabia, erosion was unleashed by overgrazing of the hills. We can see here on the landscape how the soil mantle was washed off the upper slopes to bedrock. Accelerated runoff from the bared rock cut gullies into the upper edge of the soil mantle, working it downhill as if a great rug were being pulled off the hills.

The accumulation of torrential flows during winter storms is cutting great gullies through the alluvial plains just as it does in New Mexico, Arizona, and Utah of our own country. The effect of this is to lower the water table, bringing about the effects of desiccation without reduction in rainfall.

In this manner has the country been seriously damaged, and its capacity to support a population much reduced. Unleashed and uncontrolled soil erosion is sufficient to undermine a civilization, as we found in North China and as seems to be true in North Africa as well.

The Dry Lands of North Africa

We traveled across North Africa southward toward the Sahara Desert into zones of less and less rainfall. Beyond the cultivated area in Roman times was a zone devoted to stockraising on a large scale. Thousands of cisterns were built in Roman or pre-Roman times to catch storm runoff from the land to store it for outlying villages and for watering herds of livestock during the dry summer seasons.

Many of these cisterns were being cleaned out and repaired by the French Government before World War II, to be used for the same purpose as they were in ancient times. One of the modern cisterns was four times as large as any Roman cistern, with a capacity of 100,000 cubic feet. This cistern was filled in 2 years and now furnishes water for the seminomads who inhabit this part of North Africa.

Still farther toward the desert, about 70 miles south of Tebessa, we found a remarkable example of ancient measures for the conservation of water. At some time in the Roman or possibly pre-Roman period, peoples of this region built check dams to divert storm water around slopes into canals to spread it upon a remarkable series of bench terraces.

This area of unusual interest raises a number of questions we are not yet able to answer. If these terraces were cultivated to crops in times past, they are the best evidence we have that climate has become drier since they were first built. But if they were built for spreading water to increase forage production for grazing herds, as the French are using them today, they are not evidence of an adverse change of climate. This evidence alone could leave us in doubt, but other evidence indicates that water spreading was most used here for crops.

It would be interesting to know the date and the reason for building these terraces. They may indicate that with

Roman occupation of North Africa the native tribes were driven beyond the border of the Roman Empire and were forced to devise these refined measures for conservation and use of water in a dry area. Or they may indicate that North Africa was so densely populated that it was necessary to use these refinements in the conservation of water to support the population on the margins of a crowded region.

While the land of North Africa has been seriously damaged, as one can see written on landscape after landscape, the country is still capable of far greater than its present production. In Roman times a high degree of conservation of soils and waters was reached with an intensive culture of orchards and vineyards on the slopes and intensive grain growing in the valleys.

All this depended on efficient conservation and use of the rainfall. We find numerous references to such practices in the literature of the time. But, as nomads swept in out of the desert, their extensive and exploitive grazing culture replaced these highly refined measures of land use and let them fall into disuse and ruin. Erosion was unleashed on its destructive course, and the capacity of the land to support people was seriously reduced.

The veteran student of North Africa, Professor Gautier, answered my query as to whether climate of North Africa had changed since Roman times, in the following way: "We have no evidence to indicate that the climate has changed in an important degree since Roman times, but the people have changed."

We conclude that the decline of North Africa is due to a change in a people and more especially to a change in culture and methods of use of land that replaced a highly developed and intensive agriculture and that allowed erosion to waste away the land and to change the regime of waters.

A Word About Land Use in Italy

The westward course of civilization has left its marks in Italy. We found at Paestum, south of Naples, one of the best preserved Greek temples, located on the coastal plain near the sea. Here, there was no overwash of erosional material or accumulation of dust from wind erosion and no gully erosion in the plain. We walked on the same level as the Greeks who built the temple 2,600 years ago.

But population pressure in Italy, under its smiling climate and blue skies, has pushed the cultivation line up the slopes and caused the building of villages on picturesque ridge points. In Italy there are 826 persons per square mile of cultivated land, while in the United States there are only 208.

This method of comparing population density gives us the advantage because of our vast grazing lands that support great herds of livestock. But if we had the same density of population per square mile of cultivated land in the United States as has Italy, we should have 520 million people. This gives us some idea of the relative densities and pressures of population upon the land and accounts for the intensive use not only of the plains but of the steep slopes.

We do not have space to tell the details of how the Pontine Marshes, that for 2,000 years defied the reclamation efforts of former rulers of Italy, were successfully reclaimed recently. This former pestilential area has been drained and rid of malaria and is now divided into farms equipped with reinforced concrete houses of attractive design, where families are established free from perils of malaria and safe in the security of their land.

Torrent Control in the French Alps

In southeastern France we found the same condition of intensive use of land on valley floors and on steep, terraced slopes. In the French Alps, population pressure on land of the plains has pushed the cultivation line up the slopes into mountains and has denuded grassy meadows by overgrazing.

This excessive use of the mountainous



FIGURE 11.—A terraced citrus orchard in southern France. It is believed that terraces of this type were first built in France by the Phoenicians about 2,500 years ago. Modern French farmers are still maintaining and farming such hillsides, however, because of the scarcity of good land.

areas in the French Alps unleashed torrential floods that for more than a century ravaged productive Alpine valleys. Erosional debris was swept down by recurring torrential floods to bury fields, orchards, and villages; to cut lines of communication; and to kill inhabitants of the valleys.

So serious became this menace to the welfare of the region that the French Government, after much study and legislation, undertook in 1882 a constructive program of torrent control. Since that time hundreds of millions of francs have been spent for works of torrent control that are remarkably successful.

Intensive Land Use in France

We found slopes in southern France cultivated on gradients up to 100 percent with terrace walls as high as the benches were wide. Some of these terraced fields had been under cultivation for more than a thousand years—likely much longer, for the Phoenicians are believed to be responsible for terracing in this part of France (fig. 11).

When the soils of these terraces become fatigued, as the French say, they are turned over to a depth of more than 3 feet once in 15 to 30 years as the need may be. Thereafter, a cover crop is planted on the newly exposed soil material for two or more years, followed by plantings of orchard trees or vines or vegetables.

In eastern France we found in various stages adjustments of farming to slopes. In places, terraces were built with rock walls on the contour to reduce slope gradients; elsewhere, rock walls were built on the contour to form level benches. At other places, farmers dug up the soil of the bottom furrow of their fields that were laid out in contour strip crops, loaded the soil into carts, hauled it to the upper edges of the fields, and dumped it along the upper contour furrows to compensate for downslope move-



FIGURE 12.—These French farmers are digging up the soil along the lower furrow of their field and loading it into a cart. It will be hauled uphill and spread along the upper edge. They do this job each winter to help compensate for the downhill movement of soil by erosion.

ment of soil under the action of plowing and the wash of rain (fig. 12). This was done each year. Where the slope was too steep to haul the soil uphill, they loaded the soil of the bottom furrow in baskets and carried it on their backs to the upper edges of the field. In this way these farmers of France take care of their soil from generation to generation.

In southwestern France, in the region of Les Landes, we studied, probably, the greatest achievement of mankind in the reclamation of sand dunes. It is recorded that the Vandals in A. D. 407 swept through France and destroyed the settlements of the people who in times past had tapped pine trees of the Les Landes region and supplied resin to Rome. Vandal hordes razed the villages, dispersed the population, and set fire to the forests, destroying the cover of a vast sandy area. Prevailing winds from the west began the movement of sand. In time, moving sand dunes covered an area of more than 400,000 acres that in turn created 2¼ million acres of marshland.

Sand dunes in their eastward march covered farms and villages and dammed streams, causing marshes to form behind them. Malaria followed and practically depopulated the once well-peopled and productive region. These conditions caused not only disease and death, but impoverishment of the people as well.

In 1778 Villers was appointed by the French Government to create a military port at Arcachon. He reported that it was first necessary to conquer the movement of the sand dunes, and presented the principle of "dune fixation." About 20 years later Napoleon appointed his famous engineer, Bremontier, to control these dunes.

Space will not permit my telling the fascinating details of this remarkable story—of how the dunes were conquered

by establishing a littoral dune and reforesting the sand behind, and how marshy lands were drained by Chambrelent after a long period of experimentation and persuasion of public officials. Now this entire region is one vast forest supporting thriving timber and resin industries and numerous health resorts.

Fortunately for comparison, one dune on private land was for some reason left uncontrolled. This dune is 2 miles long, ½ mile wide, and 300 feet high (fig. 13). It is now moving landward, covering the forest at the rate of about 65 feet a year. As I stood on this dune and saw in all directions an undulating evergreen forest to the horizon, I began to appreciate the magnitude of the achievement of converting the giant sand-dune and marshland into profitable forests and health resorts.

How the Dutch Farm the Ocean Floor

In Holland we found another of mankind's great achievements—the reclamation of the ocean floor for farming.

Holland is a land of about 8¼ million acres, divided into two almost equal parts—above and below high-tide level. It is inhabited by 8 million industrious people. Its land included the great delta of the North Sea built up with the products of erosion sculptured out of the lands of Germany and Switzerland and northeastern France, brought down by the Rhine and Meuse Rivers. Now 45 percent of the area lies below high-tide level and one-fourth lies below mean sea level. The Dutch from time immemorial have been carrying on an unending battle with the sea. They have become expert in filching land from the grasp of the angry waters of the North Sea.

If the United States were as densely populated per square mile of cultivated land as Holland, the population of the United States would be 1¼ billion. The density of population of Holland has called for an increase of its land area.



FIGURE 13.—One of the uncontrolled sand dunes in the Les Landes forest of southwestern France. French engineers have, in the past, brought about 400,000 acres of such dunes under control, and the area is again producing timber.

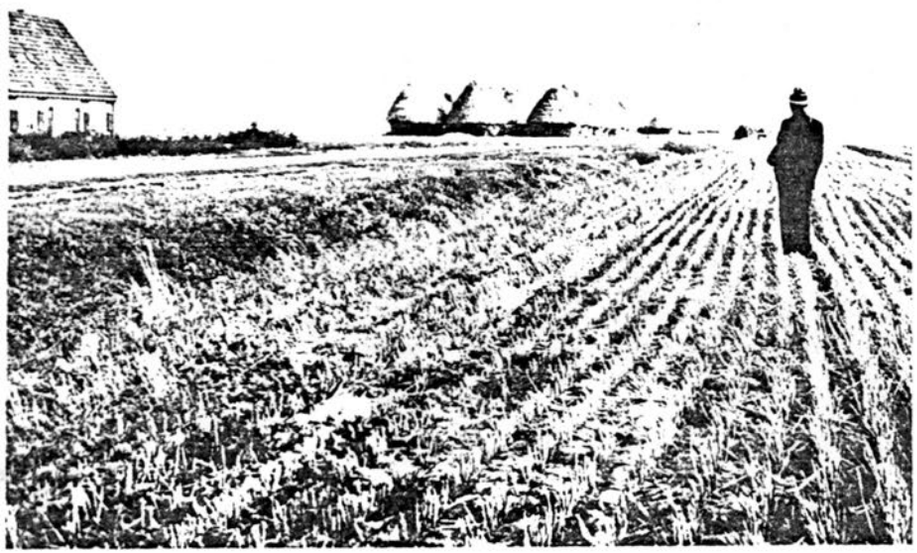


FIGURE 14.—A Dutch farm in the Wieringermeer Polder of the Netherlands. Only 7 years before this picture was taken this land was covered by the North Sea.

Rather than to seek additional land by conquest of its neighbors it has turned to the conquest of the sea.

The Zuider-Zee project, two centuries in the planning, is Holland's masterpiece in a 2,000-year battle with the North Sea. This project adds more than 550,000 acres of new land to Holland's territory, converting the old salt Zuider-Zee into a sweet-water lake renamed the Yssel Meer.

The Dutch have built great dikes to dam off the sea and have pumped the water out of the basins with great pumping plants. They have diked off the sea and dewatered the land, leached it of its salt, and converted it into productive farm land. We stood on fertile farm land that was the floor of the sea only 7 years earlier, but now is divided into farms equipped with fine houses and great barns (fig. 14). At a cost of about $200 an acre, this land was reclaimed from the sea and divided into farms.

The Dutch by this means have created a new agricultural paradise into which only select farmers may enter. Out of 30 applications for each farm, one applicant is selected on the basis of character, the past record of his family, and his freedom from debt. The successful applicant is put on probation for a period of 6 years. If he farms the land in accordance with the best interests of the land and of the country, he will be permitted to continue for another period. If he fails to do so, he must get off and give another farmer applicant a chance.

A Glance at England

In the mild climate of England, we find that tillers of soil have had little difficulty with soil erosion. This is true because rains come as mists, slopes are gentle, and fields are usually farmed to close-growing crops. England is well suited to grassland farming and to the growing of small grains. Clean-tilled crops have never been in general use. We found fields in England that have been cultivated for more than a thousand years where the yields of wheat have been raised to averages of 40 to 60 bushels per acre. The maximum yield thus far is 96 bushels to the acre. The

principal problems before the farmers of England are rotations, seed selection, and farm implements.

World War II made new demands on the lands of England. Before blockading action by the enemy, the British Isles depended on imports for two-thirds of their total food supply. One-third of their population was fed from their own lands, requiring about 12 million acres of cultivated land for this purpose. Fully 50 percent more land was plowed to grow food crops. Pastureland and grassland on slopes were cultivated. Soil erosion may become a problem more serious than ever before in British agriculture, because of the extraordinary demands for the growing of food.

The New World

And now we cross the Atlantic to the new land which was isolated from the peoples of the Old World until civilization had advanced through fully 6,000 years.

The peoples found here, presumably descendants of tribes coming from Asia in the distant past, had been handicapped in the development of agriculture by lack of large animals suitable for domestication and by ignorance of the wheel and the use of iron. They had, however, learned to conserve soil and water in a notable way, especially in the terrace agriculture of Peru and Central America and in the Hopi country of southwestern United States. Some have held that this knowledge was brought across the South Pacific by way of islands, on many of which such practices are still found. In any case, lacking iron or even bronze tools, these peoples for the most part still depended largely on hunting, fishing, and gathering—along with shifting cultivation—for their livelihood. Thus, the soil resources seem to have been for the most part almost unimpaired.

To the peoples of the Old World, the Americas were a land of promise and a release from the oppressions, economic and political, brought on by congested populations and failures of people to find adjustments to their long-used land.

North America, as the first colonists entered it, was a vast area of good land, more bountiful in raw materials than ever was vouchsafed any people. Its soils were fat with accumulated fertility of the ages; its mountains were full of minerals and forests; its clear rivers were teeming with fish. All these were abundant—soil productivity, raw materials, and power for a remarkable civilization.

Here was the last frontier; for there are no more new continents to discover, to explore, and to exploit. If we are to discover a way of establishing an enduring civilization we must do it here: this is our last stand. We have not yet fully discovered this way; we are searching for the way and the light. Here is a challenge of the ages to old and young alike. Here is a chance to solve this age-old problem of establishing an enduring civilization—of finding an adjustment of a people to its land resources.

Our land is like a great farm with fields suited to the growing of cotton, corn, and other crops and with land for pastures, woods, and general farming. In the West, our country has vast grazing lands well suited to the raising of herds of sheep and cattle and fertile alluvial valleys in the arid regions, overawed by high mountains that condense the waters out of moisture-laden winds to irrigate garden lands. Such is the American farm, capable of feeding at least 350 million people when the land is intensively cultivated under full conservation and fully occupied with a complex division of labor that will give us a higher general standard of living than we enjoy today.

The Record of Our Own Land

But now let us read the record of our own land in a short period of 300 years.

In the past 150 years, our occupation of this fabulous land has coincided with the coming of the age of science and power-driven machines.

Along the Atlantic coast in the Pied-

mont we find charming landscapes of fields with red soils and glowing grain fields. But in their midst we find an insidious enemy devouring the land—stealing it away, ere we are aware, by sheet erosion, rain by rain, washing it down into the streams and out to the sea. Sheet erosion, marked by shallow but numberless rills in our fields, is blotted out by each plowing.

We forget what is happening to the good earth until we measure these soil and water losses. More than 300 million acres out of our 400-odd million acres of farm fields are now eroding faster than soil is being formed. That means destruction of the land if erosion is not controlled.

We are not guessing. Erosion experiment stations located throughout the country have given us accurate answers. Let us compare rates of erosion under different conditions of land coverage and use. Measurements through 5 years at the Statesville, N. C., erosion experiment station show that, on an 8-percent slope, land in fallow without cropping lost *each year* an average of 29 percent of rainfall in immediate runoff and 64 tons of soil per acre in wash-off of soil.

This means that in 18 years, 7 inches of soil (the average depth of topsoil) would be washed away. Under continuous cropping to cotton, as was once the general practice in this region, the land lost each year an average of 10 percent of rainfall and 22 tons of soil per acre per year.

At this rate it would take 44 years to erode away 7 inches of soil. Rotations reduced, but did not stop, erosion for the land lost 9 percent of the rain and enough soil so that it would take 109 years to erode away 7 inches of soil. That is a very short time in the life of our Nation. But where the land was kept in grass, it lost less than 1 percent of rain and so little soil that it would take 96,000 years to wash away 7 inches of soil. This rate is certainly no faster than soil is formed.

Under the natural cover of woods, burned over annually, as has unfortunately been the custom in southern woods, each year the land lost 3½ percent of rain and 0.06 ton of soil per acre so that it would take 1,800 years to erode away 7 inches of soil. But where fire was kept out of the woods and forest litter accumulated on the forest floor, the land lost less than one-third of 1 percent of the rainfall. And, according to the calculations, it would require more than 500,000 years to wash away 7 inches of soil. Such a rate of erosion is indeed far below the rate of soil formation.

Here in a nutshell, so to speak, we have the underlying hazard of civilization. By clearing and cultivating sloping lands—for most of our lands are more or less sloping—we expose soils to accelerated erosion by water or by wind and sometimes by both water and wind.

In doing this we enter upon a regime of self-destructive agriculture. The direful results of this suicidal agriculture have in the past been escaped by migration to new land or, where this was not feasible, by terracing slopes with rock walls as was done in ancient Phoenicia, Peru, and China.

Escape to new land is no longer a way out. We are brought face to face today with the necessity of finding out how to establish permanent agriculture on our farms under cultivation before they are damaged beyond reclamation, and before the food supply of a growing population becomes deficient.

In an underpopulated land such as ours, farmed extensively rather than intensively, there will be considerable slack before privations on a national scale overtake us. But privations of individual farm families, resulting from wastage of soil by erosion, are indicators of what will come to the Nation. As our population increases, farm production will go down from depletion of soil resources unless measures of soil conservation are put into effect throughout the land.

We must be in possession of a certain amount of abundance to be provident: a starving farmer will eat his seed grain; you will do it and I will do it, even

though we know it will be fatal to next year's crop. Now is the time, while we still have much good land capable of restoration to full or greater productivity, to carry through a full program of soil and water conservation. Such is necessary for building here a civilization that will not fall as have others whose ruins we have studied in this bulletin.

A solution to the problem of farming sloping lands must be found if we are to establish an enduring agriculture in the United States. We have only about 100 million acres of flat alluvial land where the erosion hazard is negligible, out of 460 million acres of land suitable for crops. Most of our production comes from sloping lands where the hazard of soil erosion is ever present. This calls urgently for the discovery, adaptation, and application of measures for conserving our soils.

In the results of the Statesville erosion experiment station we saw how a forest with its ground litter was effective in keeping down the rate of soil erosion well within rates of soil formation. Out of untold ages of unending reactions between forces of erosion that wear down the land and forces of plant growth that build up the land through vegetation, the layer of forest litter has proved to be the most effective natural agent in reducing surface wash of soil to a minimum. Here is clearly our objective for a permanent agriculture, namely, to safeguard the physical body of the soil resource and to keep down erosion wastage under cultivation as nearly as possible to this geologic norm of erosion under natural vegetation.

A few years ago I came upon a hill farmer in an obscure part of the mountains of Georgia. He was trying to apply on his cornfield the function of forest litter as he saw it under the nearby forest on the same slope and same type of soil.

It was for me a great experience to talk with J. Mack Gowder of Hall County, Ga., about the fields he had cultivated for 20 years in a way that has caught the



FIGURE 15.—A formerly productive field in Virginia that has been cut to pieces by gully erosion. About 50 million acres of good farm land in the United States have been ruined for further practical cultivation by similar types of erosion.

imagination of thoughtful agriculturists of the Nation. We talked about the simple device of forest ground litter and how effective it is in preventing soil erosion even on steep slopes, and how he thought that if litter at the ground surface would work in the forest it ought also to work on his cultivated fields along the same slope.

Mr. Gowder told me how, as a young man when he bought this steep wooded land more than 20 years ago, he hoped to avoid the soil erosion that was ruining farms on smoother and better land of the country. He planned to do this by stirring his land with deep plowing but without turning the soil.

In this way, he could leave his crop litter at the surface to do the same kind of work that the forest litter does. Gowder chose a bull-tongue plow, only 4 inches wide, to do the trick. He told me that his neighbors laughed at him for such foolish ways of plowing. As a concession to customs of the region, he put in channel terraces with a slight grade as a precaution against storm runoff from unusual rains. But, thus far, they have not been needed.

Now Gowder is cultivating topsoil on slopes up to 17 percent whereas his ridiculing neighbors have only subsoil to farm. They have lost all their topsoil by erosion.

Leaving crop litter, which is sometimes called stubble mulch or crop residue, at the ground surface in farming operations is one of the most significant contributions to American agriculture. Certain adaptations of the method need to be made to meet the problems of different farming regions, but the new principle is the contribution of importance.



FIGURE 16.—This airplane view shows parts of six different farms near Temple, Tex., where the farmers have banded together to combat erosion as a community problem.

Danger Signs in America

Sheet erosion develops into gullies if allowed to continue unchecked for a few years. Such gullies become numberless gutters, leading off storm waters and flash floods that gouge out miniature gorges and ruin the land for further cultivation (fig. 15). Material washed out of such gullies is swept down into river valleys to shoal streams, filling reservoirs, and destroying water storage for hydroelectric power and for irrigation.

One of the most important findings of this survey of the use of land through 7,000 years is that tillers of soil have encountered their greatest problem throughout the ages in trying to establish a permanent agriculture on sloping lands. We have read the record, as written on the land, of failures from place to place but of few instances of success. This same problem is with us in our new land of America, where millions of acres have been destroyed for further cultivation and abandoned.

The Way to an Enduring Agriculture

Our solution for safeguarding our soils on slopes where soil erosion by water is the hazard is (1) to increase the rainwater-intake capacity of the soil by retaining crop litter at the surface, soil improvement, crop rotations, and strip cropping on the contour and (2) to lead away unabsorbed storm waters in channels of broad-base terraces into outlet channels and into natural drainage channels. We have applied these measures during recent years over millions of acres as you may see from an airplane when you fly over the country.

Near Temple, Tex., in the drainage of North Elm Creek, 174 farmers of bordering farms formed a soil conservation association on a drainage basis, ignoring property and county lines in the same way as runoff water ignores such arbitrary lines (fig. 16). Terrace-outlet channels were laid out to carry water harmlessly through one farm and another to natural drainage channels. One terrace-outlet system may serve in this way as many as 5 farms. By this approach to conservation, it is possible to treat the land in accordance with its adaptabilities and to control storm waters according to hydraulic principles. This is indeed physiographic engineering that builds a lasting basis for a thriving civilization.

This does not mean that we have yet found the final answer to full control of soil erosion. Our present practices may not yet stop erosion but will reduce it more and more as application of measures is more and more complete. These measures and others will need further improvement and adaptation to the problems as use of land becomes more and more intensive.

Wind erosion is a serious and destructive problem but restricted to a smaller area of the country than water erosion. Wind erosion attacks level as well as sloping cultivated land in semiarid parts of the country. Wind erosion sorts the soil more thoroughly than water erosion, lifting fine and fertile particles of soil aloft and leaving behind coarser and heavier particles that become sandy hummocks, then sand dunes. Such was the case in the so-called Dust Bowl of the Great Plains.

Control of wind erosion is based first upon a suiting of the land's use to its capabilities and conserving all or most all of the rain that falls on it. This calls for contour farming except on flat lands. Appropriate measures include strip shelter belts of crops, tillage practices that leave crop litter or residue at the surface, and rotations suited to moisture supplies in the soil. These, with progressive improvement of soil-management practices, will control wind erosion. It has proved a simpler task, however, to control wind erosion than the less spectacular but more insidious water erosion.

Lessons From the Old World

In this discussion on lessons from the Old and New Worlds in conserving the

vital heritage of our people, I have laid special emphasis on saving the physical body of soil resources rather than their fertility. Maintaining fertility falls properly to the farmer himself. Conserving the physical integrity of the soil resource falls to the Nation as well as to the farmer and landowner, in order to save the people's heritage and safeguard the national welfare. If the physical body of the soil resource is saved, we as a people are safeguarded in liberty of action. We can apply fertilizer and plant a choice of crops in accord with market demands and national needs.

If the soil is destroyed, then our liberty of choice and action is gone, condemning this and future generations to needless privations and dangers. So big is this job—of saving our good land from further damage and of reclaiming to some useful purpose vast areas of seriously damaged land—that full cooperation of the individual interest of farmers with technical leadership and assistance of the Government is not only desirable, but necessary, if we are to succeed.

Another conclusion from our survey of the use of land through 7,000 years, where economic conditions have changed for better or for worse more rapidly than climate, is that land after all is not an economic commodity. It is an integral part of the Nation even as its people are and requires protection by the individual owner and by the Nation as well. Nowhere have we found more telling evidence of this than in California where gold in 1849 lured a host of people to the State, but soils of its valleys have maintained its settlement.

An "Eleventh Commandment"

When in Palestine in 1939, I pondered the problems of the use of the land through the ages. I wondered if Moses, when he was inspired to deliver the Ten Commandments to the Israelites in the Desert to establish man's relationship to his Creator and his fellow men—if Moses had foreseen what was to become of the Promised Land after 3,000 years and what was to become of hundreds of millions of acres of once good lands such as I have seen in China, Korea, North Africa, the Near East, and in our own fair land of America—if Moses had foreseen what suicidal agriculture would do to the land of the holy earth—might not have been inspired to deliver another Commandment to establish man's relation to the earth and to complete man's trinity of responsibilities to his Creator, to his fellow men, and to the holy earth.

When invited to broadcast a talk on soil conservation in Jerusalem in June 1939, I gave for the first time what has been called an "Eleventh Commandment," as follows:

Thou shalt inherit the Holy Earth as a faithful steward, conserving its resources and productivity from generation to generation. Thou shalt safeguard thy fields from soil erosion, thy living waters from drying up, thy forests from desolation, and protect thy hills from overgrazing by thy herds, that thy descendants may have abundance forever. If any shall fail in this stewardship of the land thy fruitful fields shall become sterile stony ground and wasting gullies, and thy descendants shall decrease and live in poverty or perish from off the face of the earth.

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