

**STUDY TO DETERMINE THE IMPACTS OF  
NON-FEDERAL RESERVOIR AND LAND TERRACING  
ON THE REPUBLICAN RIVER VIRGIN WATER SUPPLY  
7/18/03 Draft Outline**

I. Settlement Requirements – Section VI.

A. Evaluate available methodologies, existing data and relevant studies related to determining the impacts of Non-Federal Reservoirs and land terracing practices on water supplies.

1. Methodologies

- a. Multiple Regression: (doesn't tell case & data records may not be significant statistically) should summarize what previous studies have shown.
- b. Synoptic – Hydrogeomorphic: (may not have basins that we can compare to address with and without but we do have before and after)
- c. Water Budget Approach
- d. Rational Method: (Tech. Bulletin 1352)
- e. Soil Water Balance Models: (POTYDR , SWAT and others)
- f. Direct Measurement at Sample Locations: Ground measurements (metering of terraces and ponds), satellite photos, etc.
- g. Change in Crop Yield Trends (with and without terraces)
- h. Combination of above

3. Studies/Reports

- a. Perspectives on Sustainable Development of Water Resources in Kansas, 1998
- b. Estimating Yield from Watershed Undergoing Changes, 1995
- c. Republican River Basin Water Management Study, 1985
- d. Impact of Improved Agricultural Water Use Efficiency on Reservoir Storage, 1984
- e. Missouri River Basin Hydrology Study Final Report, 1983
- f. Agriculture Water Use Including Identification of Irrigated Lands, 1982
- g. Missouri River Comprehensive Framework Study, 1966
- h. Evaluation of Relative Effect of Conservation Measures & GW Pumping, 1999
- i. Republican River Basin Neb. Water and Related Land Resources Study, 1978
- j. Technical Bulletin No. 1352, 1966
- k. Statistical Estimation of Streamflow Depletion from Irrigation Wells, 2002

B. Determine general types of relevant data available.

1. Potential Data Resources

- a. NRI – Terraces/Tillage
- b. SURGO data base - Small reservoirs
- c. Digital Orthroquads
- d. State Inventory of Dams
- e. RRCA Model: Input and output data
- f. CTIC – Tillage
- g. Satellite/Aerial Photos

2. Non-Federal Reservoirs data needs

- a. Surface area of reservoirs
- b. Reservoir Volume
- c. Reservoir type (use)
- d. Condition of reservoir (% silted in, breached, etc.)
- e. Reservoir location
- f. Contributing Drainage Area
- g. Date Reservoir Constructed/retired

2. Land Terraces data needs

- a. Surface area of land terrace
- b. Land terrace type
- c. Condition of Terrace (% silted in, replaced with sprinkler irrigation, etc)
- d. Land terrace location
- e. Contributing Drainage Area
- f. Date Terrace Constructed/retired or replaced with sprinkler irrigation.

3. Soil Characteristics

- a. Permeability
- b. Hydrologic group
- c. Soil water holding capacity

4. Geologic Characteristics

- a. Presence and distribution of aquitards or aquicludes

5. Drainage Characteristics

- a. Slope Percent or Degree
- b. Slope Length
- c. Topographic characteristics

6. Streamflow Records

- a. Total stream flow
- b. Baseflow
- c. Surface Flow (non-baseflow)

7. Precipitation

- a. Amount
- b. Timing
- c. Frequency
- d. Intensity
- e. Location

8. Evaporation/Evapotranspiration

- a. Climatic data
- b. Pan Evap
- c. RRCA Model

9. Landuse / Landcover

- a. Past Cropping Patterns
- b. Current Cropping Patterns
- c. Future Cropping Patterns
- d. Tillage practices

C. Determine basin wide availability and assess accuracy and precision of data.

- 1. RRCA Model (data has been verified and accepted)
- 2. Sampling and Ground Truthing
- 3. Statistical tests
- 4. Missing data will need to be addressed (fill in holes)

D. Agree on standards for data.

E. Identify additional data required to determine quantitative changes in the water supply resulting from the construction of terraces or non-federal reservoirs.

F. Propose a method for assessing area-capacity relationship for non-federal reservoirs.

- 1. Field sampling
- 2. NRCS Method

G. Submit a study plan to determine the quantitative changes in the water supply resulting from the construction of terraces and non-federal reservoirs, including if such changes can be determined for each Designated Drainage Basin, to the RRCA.

II. Define the Study Proposal Outline –

A Background

B. Statement of Problem

C. Purpose of Study

D. Survey of Literature

1. Methodologies
2. Data Evaluation

E. Proposed Methodology

1. Data Needs
2. Analytical Procedures
3. QA-QC

F. Outputs

G. Study Administration

H. Timeline for completing study within 5 years of date proposed study is accepted by RRCA

I. Budget Needs

J. Evaluation and follow up.

III. Study Administration: The Conservation Committee will administer the Study but may contract certain portions to a university or other entity.