



Resource development of minor drainage basins  
by Clarence F Gilfeather

A THESIS Submitted to the Graduate Faculty in partial fulfillment of the requirements for the degree of Master of Science in Agricultural Economics  
Montana State University  
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**Abstract:**

Small water projects have attracted increasing interest in recent years. This interest stems from an apparent need for an intermediate type organization for resource development to serve the area beyond which private investments are feasible and the area which possesses adequate resource potential to justify development as all or a part of a Federally sponsored project. This "gap in between" embraces a vast, spatial sector of the West which includes most of the Western Great Plains and mountain foothill areas.

This thesis embodies an attempt to think through the problems associated with resource development and the implications of these as they may pertain to the development of minor drainage basins, it endeavors to place the various elements in the problem into a cause-effect sequence consistent with the definition of resource development as defined in the introduction to the study. Due to the extensive nature of the problem this paper is confined to the broader aspects of it. It is intended more to provoke interest in the subject matter than to provide specific problem solutions.

Part I Contains this writer's definition of resource development, a definition of the problem situation, and a general description of the problem.

Part II consists of an attempt to search out and define the various elements in the problem and place these in their proper perspective relative to the problem.

The character of the problem area and the situation studied is described in Part III. It contains a benefit-cost analysis along with a discussion and analysis of the organisational and institutional phases of the problem.

The conclusion contained in Part IV consists of a summary of the problem and suggested means for achieving a more effective project organization.

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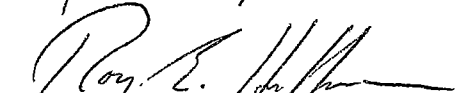
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## PREFACE AND ACKNOWLEDGEMENTS

The need for an action program on an intermediate level between what Federal reclamation is doing and what can be accomplished by individuals acting alone or in small groups to bring additional resources into production has been the subject of numerous dissertations. It is with appropriate humility that this writer undertakes to set forth what he considers to be the elementary factors in the problem and policy objectives that should define direction for public action.

I wish to thank my thesis committee and other members of the faculty of Montana State College for the stimulation they have given me. All individuals and agencies contacted in connection with this study were kind and cooperative, particularly representatives of the Montana State Water Conservation Board who were very helpful.

ABSTRACT

Small water projects have attracted increasing interest in recent years. This interest stems from an apparent need for an intermediate type organization for resource development to serve the area beyond which private investments are feasible and the area which possesses adequate resource potential to justify development as all or a part of a Federally sponsored project. This "gap in between" embraces a vast, spatial sector of the West which includes most of the Western Great Plains and mountain foothill areas.

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The conclusion contained in Part IV consists of a summary of the problem and suggested means for achieving a more effective project organization.

## PART I

## INTRODUCTION TO THE PROBLEM

This study is concerned with the resource development of minor drainage basins. It is directed particularly to the determination of a method to serve as a guide for the development of the minor basins that make up the drainage network of the foothills and plains areas east of the Continental Divide in Central and Eastern Montana.

Resources and Resource Development Defined

/// A resource is defined as wealth or a productive capacity. Erick W. Zimmerman states, "Resources are not, they become; they are not static but expand and contract in response to human wants and human actions." 1/ He goes on to describe these not as substances or things, but functions performed by substances and things in a production process to satisfy human wants and aims.

Resource productivity is measured in terms of how well functions fulfill needs and aims, or stated differently, in how fully the resource is employed. The extent to which a resource is employed depends on (1) the need for it, (2) the availability of it, and (3) whether or not people know how to use it. A shift in all or any one of these factors will retard or expand resource productivity. Since the demands of society are not static, the level of resource productivity is the state of flexibility by which substances and things respond to suit demands or needs through time. Resource development can therefore be defined as a secular rate of

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1/ Zimmerman, Erick W., World Resources and Industries, Harper and Brothers, New York, Revised Edition, 1951, p. 15.

growth in resource productivity where the increase in growth as measured at any given time is synonymous with the increase in flexibility by which functions are performed to satisfy demands and needs.

#### Minor Drainage Basins Defined

Minor drainage basins are construed to mean the tributary drainages that are generally by-passed by government investment policy and are too limited in resources to attract autonomous investments of a sufficiently sustaining type to avoid periodic economic and social maladjustments.

#### The Problem Situation

The problem stems from the relatively low and variable precipitation pattern of the area. Rainfall is not so limited that it prohibits economic use. In some parts of the area large acreages are cultivated and have been for many years. The grasslands provide a highly palatable forage and in most seasons a sizable amount. The problem arises from the production requirements placed upon the land over a period of years in relation to land capability during periods of drought. A type of use or rate of use to secure an average production for a normal rainfall period is marginal when the precipitation falls below normal.

Forced disinvestments follow drought and the fall in land values that accompanies forced disinvestments invites new investments of the same type when climatic conditions improve. In this manner the problem tends to perpetuate itself.

Agricultural units consist of dryland grain farms and range livestock operations largely dependent upon year around range use, or a combination of both. These units lack operational flexibility. There is seldom a

reserve. Relatively few compensatory measures can be exercised to alleviate the impact of drought and particularly drought of three to four years duration. The "rolling up and unrolling" so commonly described in connection with periodic drought is not confined to the agricultural sector. Whole communities and business centers roll up and unroll right along with the farms and ranches.

Early settlers of the Western Great Plains were not long in discovering water to be the limiting factor in both the agricultural and non-agricultural industries. The more stable settlements developed along streams. Agricultural units became established as irrigated farms or ranches using irrigated lands for winter feed bases. The old low water ditch, however, is a thing of the past. Available water supplies were appropriated early. The cost of developing comparable properties has become progressively greater due to the necessity for storage reservoirs to provide a water supply, the need for sizable carrying systems, and the increased cost of farm improvements. For these reasons there has been little expansion of privately owned irrigation systems beyond the headwater areas.

Federal projects do not take up at the point where private irrigation is no longer feasible. These are generally confined to the major drainage ways, are multiple purpose as to aims, and usually do not provide the stability and other forms of opportunity required in areas tributary to the large drainages.

The situation is one of instability which places a ceiling on growth to the future. The root of the problem lies with the inadequacy of existing devices to bridge the gap between private and public investments.

The Purpose of Study and Area Studied

The State of Montana has a reclamation agency, the Montana State Water Conservation Board. This agency carries on an action program for irrigation, rural electrification, municipal water developments, and can provide a variety of other functions for the State as needs dictate. 2/ The Board 3/ was organized in 1933. The primary task at the time of inception was to direct the spending of Federal relief funds in the State of Montana in order to make the highest possible use of these funds.

The Musselshell River Drainage in Central Montana was the object of considerable expenditure of this type and the developments initiated at that time have been expanded upon as a State Water Board project since the termination of the Federal relief program.

It is hoped that through an examination of this State sponsored project and the area involved, a better understanding can be had of an intermediate type government sponsored program as to its potentialities and limitations for meeting the needs of the problem area.

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2/ See Sections 89-101, Laws Pertaining to the State Water Conservation Board, State of Montana, Title 89, Chapters 1 and 4, Revised Codes of Montana, 1947.

3/ The Montana State Water Conservation Board.

## PART II

## ELEMENTS IN THE PROBLEM

Before one can evaluate a problem it is necessary to gain a perspective of the problem, particularly of the inherent factors which contribute to it. This part is concerned with a search of the account in an attempt to place the events in their proper sequence relative to the problem situation. Writers in the field of resources development involving public programing have thoroughly outlined numerous of the more important elements in the problem of resource development. 1/ For the purpose of this study the various factors will be examined in relation to their natural, economic, and institutional contributions to the situation, as well as the social and public aspects of it.

Natural Factors

M. M. Kelso has stated that if any single problematic feature of the West could be reconciled the one which would receive the most unanimous support of the people who habitate the area would be in the form of measures to counteract the effects of the highly variable climate. 2/ The influence which climate exerts is extended to and never absent from all activities of the society including its economic, institutional, social,

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1/ Huffman, Roy E., "War and Post-War Problems of Irrigation Planning in the Northern Plains", The Journal of Land and Public Utility Economics, Vol. XIX, No. 4, Nov. 1943, p. 455.

Cooke, Morris L., et al, "A Water Policy for the American People", United States Government Printing Office, Washington, D. C., Vol. 1, Dec. 1950, pp. 58-61.

2/ Kelso, M. M., "New Directions in Land Economics Research", Journal of Farm Economics, Proceedings No., Vol. XXXI, No. 4, Part 2, p. 1035.

































































































































































































































