



Success of irrigation farmers as affected by methods of farm development
by Maurice Melendez

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:

This study attempts to find some indications of the relative success of different development systems in the Buffalo Rapids irrigation project. Success is measured in terms of capital accumulation, standard of living and settler turnover.

Chapter I introduces the problem situation and previous work done in the area studied, with the methods used. This is followed by a description of the area.

Chapter II concerns the policy of the United States in connection with irrigation, and land reclamation by irrigation. It covers reclamation by the individual, the states, the Federal Government. Irrigation policies in Spain and Italy are mentioned and compared with the United States policies.

Chapter III presents the problem and the hypothesis, with the method used to prove or disprove it. The assumptions are pointed out together with the limitations.

Chapter IV presents the data and the analysis of it. Settler turnover is studied and possible causes of it are mentioned. The net worth of settlers is studied both in the type of assets they have and in total for three points in time. Curves are obtained which indicate differences in rate of capital accumulation for the different classes and for two periods of time settlement to 1950 and 1950 to 1955. The Fallon area recently opened to settlers is briefly mentioned. New settlers on the farms sampled in 1950, and settlers of the 1950 sample on new farms are also studied.

Chapter V is a summary. Conclusions, which consider how far the hypothesis has been proven are drawn, and recommendations both for further study and for the project as a whole are made.

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BY METHODS OF FARM DEVELOPMENT

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in
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ABSTRACT

This study attempts to find some indications of the relative success of different development systems in the Buffalo Rapids irrigation project. Success is measured in terms of capital accumulation, standard of living and settler turnover.

Chapter I introduces the problem situation and previous work done in the area studied, with the methods used. This is followed by a description of the area.

Chapter II concerns the policy of the United States in connection with irrigation, and land reclamation by irrigation. It covers reclamation by the individual, the states, the Federal Government. Irrigation policies in Spain and Italy are mentioned and compared with the United States policies.

Chapter III presents the problem and the hypothesis, with the method used to prove or disprove it. The assumptions are pointed out together with the limitations.

Chapter IV presents the data and the analysis of it. Settler turnover is studied and possible causes of it are mentioned. The net worth of settlers is studied both in the type of assets they have and in total for three points in time. Curves are obtained which indicate differences in rate of capital accumulation for the different classes and for two periods of time settlement to 1950 and 1950 to 1955. The Fallon area recently opened to settlers is briefly mentioned. New settlers on the farms sampled in 1950, and settlers of the 1950 sample on new farms are also studied.

Chapter V is a summary. Conclusions, which consider how far the hypothesis has been proven are drawn, and recommendations both for further study and for the project as a whole are made.

CHAPTER I

INTRODUCTION

This study concerns the progress made by a number of settlers on the Buffalo Rapids Irrigation Project which was established in 1937. This is the second study attempting to measure the progress settlers have made on this project. The first study was conducted in 1950, measuring progress from date of settlement up to 1950.^{1/} The present study, although it goes in some instances as far back as 1937, is mainly concerned with the progress from 1950 to 1955.

There are several reasons for studying the development of irrigated farms. At the present rate of population growth the demand for agricultural products will increase. Irrigation is a stabilizing factor in western farming because it enables farmers to contract and expand farm businesses to fit weather conditions without dispersing their breeding herds. Probably the most important reason is the American people want family farms, and the West, through irrigation, can be reclaimed.

If more family farms are to be developed in the future, information is needed on the best method of developing them. That is the reason for this study.

Two methods have been used to develop these farms, one by the government, the other by the private landowner. It is of interest to determine

^{1/} Clyde E. Stewart and D. C. Myrick, Control and Use of Resources in The Development of Irrigated Farms, Montana Agricultural Experiment Station, Bozeman, Bulletin 476, October, 1951.

which of these two methods or what combination of methods is the most economical: i.e., economical from the point of view of the taxpayer who foots the bill for the original expenditure when the government develops the farm, economical too, from the point of view of the settler who invests his time, money and effort in an attempt to secure an acceptable standard of living.

There have been two general government policies with respect to water delivery and the extent of predevelopment of farms in federally developed irrigation projects. One policy has been to merely take the water to the high point of each farm and let the settler carry on the work of turning the dryland into an irrigated farm. This policy can be considered the policy of the United States over time, and has been blamed for much of the large settler turnover on new irrigation projects.^{2/}

The other policy consists of developing the farms fully, even to the extent of growing a crop or two. This policy has been more limited in its scope, and was used during the depression of the 1930's as a means of resettling farmers affected by drought.

The first policy bases the change from dryland to irrigation farming on what the farmer can save. Therefore the change from dryland to irrigation is slow.

The second policy is based on an initial government investment. The change from dryland to irrigation farming is faster. If farms are fully developed by the government the taxpayer finances the development and

^{2/} R. E. Huffman, Irrigation Development and Public Water Policy, The Ronald Press Co., New York, 1953, p. 101.

shoulders most of the risk. If farms are not developed by the government, the settler bears the risk and cost. Probably between these two policies there is a point where both taxpayer and settler bear a more equitable share of the cost and risk of developing an irrigation project. The dollars invested in a project are considered the cost. And the risk is that these dollars may not accomplish what they were meant to accomplish.

In 1950 the first study of this project was made under the auspices of the United States Department of Agriculture. The work plan mentions the need for irrigation development research if 5,000,000 potentially irrigable acres in the Missouri Basin are to be put "under the ditch." It goes on to add:

"Economic information and analysis are needed in order to plan and implement this program. The development of an adequate foundation in economic research will help to determine which of the proposed projects should be developed, the order of priority of development, the extent of development feasible in any area, the amount of total development costs and the operation and maintenance costs which can be borne by agriculture in the area, the sizes and types of farms and farm organization feasible . . ."^{3/}

Stewart and Myrick in measuring the success in settlement for different degrees of development used four criteria. These are:

1. asset accumulation and control by the family since settlement
2. level of living
3. stability of tenure
4. rate of development

^{3/} Work Plan under Memorandum of Understanding between the Montana Agricultural Experiment Station and the Bureau of Agricultural Economics, United States Department of Agriculture.

Because the length of time since settlement varied a great deal, asset accumulation could not be used as a class comparison. However, the differences between development classes measured by the annual net worth gain were statistically significant.

The differences between levels of living for the development classes were statistically significant, however, living expenses were not.

The rate of development would affect the standard of living, capital accumulation and stability of tenure; and would have to be decided by society as a whole taking into account availability of capital and need for irrigation projects. When the Buffalo Rapids Project was started there was a great surplus of labor, and the economy as a whole needed large government investments. These conditions may not occur again.

Suitable sites where irrigated farms can be developed relatively easily have mostly been taken up (river flood plains and lowlands) so that more and more capital investments are needed to develop irrigated farms on higher land.

Because of economies of large scale development, irrigated farms have been developed by the government of the United States in a number of irrigation projects. Buffalo Rapids is one of them.

The Buffalo Rapids Project

The project extends from about 18 miles northeast of Miles City to Glendive. It is not a continuous irrigated strip, but is divided into two irrigation districts. District I has one unit and District II has three units; Shirley, Terry and Fallon. District I is on the north bank

of the Yellowstone and District II is downstream on the south bank. The project borders Miles City on the south and extends northeasterly to the outskirts of Glendive.

In 1955 there were 214 farms on the project with a total of 24,564 acres cultivated of which 22,553 were irrigated. Of these 214 farms, 51 were operated by tenants and 163 were owner operated.

Sugar beets are the main cash crop, grown on 2,672 acres in 1955, followed by wheat which covered 1,585 acres. Some lambs and sheep are fed in conjunction with the sugar beets. The irrigated pastures are a reliable source for summer grazing and hay for winter feeding of stock.

The Irrigation System

The Yellowstone River is the source of water for the whole project. The Glendive pumping plant, which serves all of District I, consists of three pumping units each one driven by a 1,500 horsepower, 2,300 volt synchronous electric motor operating against an average head of 103 feet and lifting 110 cubic feet of water per second. From 1951 to 1955 this pumping plant used roughly 5 million kilowatt hours per year, at 2.5 mills per kilowatt hour.

In District II, the Shirley pumping plant has three pumping units, each driven by a 250 horsepower, 2,300 volt synchronous electric motor operating against a head of 51 feet, and lifting 37 cubic feet of water per second. The Terry pumping plant has three pumping units each driven by a 300 horsepower, 2,300 volt synchronous electric motor, operating against a head of 109 feet, and lifting 20.5 cubic feet of water per

second. The Fallon unit has two pumping plants. The main pumping plant has three units, each driven by a 300 horsepower, 2,300 volt electric motor operating against a head of 45 feet, and lifting 24 cubic feet of water per second. The relift plant has two units, each driven by a 250 horsepower, 2,300 volt electric motor, operating against a head of 90 feet, and lifting 20 cubic feet of water per second. These four plants used roughly 2,300,000 kilowatt hours in 1951, and 5,300,000 in 1955 averaging over the five-year period a total of 3,391,901 kilowatt hours yearly, at 2.5 mills per kilowatt hour.

Climate

The project is in a semiarid region with an average annual precipitation of 13.5 inches. Temperatures have ranged from -65°F . to 117°F . during the last 60 years. It has an altitude of 2,250 feet above sea level. The average number of frost-free days is 134 yearly.

Soils

The soils are alluvial and were deposited by the Yellowstone River. In the development of the project they were leveled to make them suitable to irrigation. Many sand lenses are obvious, making irrigation difficult. Some soils have heavy subsoils which impede drainage. Drainage of the whole project was practically completed in 1956. Alkali soils were becoming a problem, but with completion of the drainage system the problem should disappear with time. Twenty-five miles of drains have been

completed, including four miles of tile drains. The soil texture ranges from clay to sand, with clay loams predominating.

Development Systems

District I of the project was built with funds provided by the Emergency Relief Appropriation Act of 1937, subject to the provisions of the Reclamation Act of June 25, 1910.

District II is a water conservation and utilization project, authorized under the Great Plains Act of 1939. Also for this second district, Work Projects Administration funds amounting to a little over a million dollars were used. This grant was to provide relief labor and was not to be repayed into the Federal Treasury.

The total amount expended on both districts up to 1954 amounted to \$3,876,413 or \$159 per irrigated acre.

The Federal Government had originally intended to buy all the land on the project, level it, set up the irrigation system and buildings, and eventually sell it to farmers as small family farms. However, some farms were left in private ownership and developed^{4/} by the government under contract with the owners. These farms will be referred to hereafter as "privately developed farms."

All the rest of the farms were government developed on government owned land. However, the degree of development and the system of

^{4/} "Developed" in this case should be understood to mean leveled and irrigation ditches constructed. The buildings were already on the farms.

transferring them to private ownership varied. Insofar as degree of development, all the farms were leveled and irrigation ditches constructed. Some had buildings erected, while others did not.

When the Federal Government had control of the project, some farms were rented and others sold. In 1952 all farms were transferred to private ownership which was the intent of the program and their operators were given a chance to buy the farm. The payments are now made through the Buffalo Rapids Association to the Soil Conservation Service. The amount paid varies; however, in all cases it is a self-amortizing loan with a fixed amount paid yearly.

At present all farms are privately owned, some are rented, and all have buildings on them except for one or two exceptions. In the present study the farms are divided into six groups according to the system of development, the degree of development and their ownership, as it was in 1949.^{5/}

Water Use and Repayment Schedule

In District I 43,792 acre feet of water were diverted in 1955. Of this amount, 24,100 acre feet of water were delivered to the farmers (55.03 percent of the diverted water), the rest being main canal or lateral losses and waste. The amount received by farmers was 1.77 acre feet of water per acre.

^{5/} Development classes are: I and II -- privately or publicly developed, owned or rented; III -- publicly developed and sold without buildings; IV -- publicly developed and sold with buildings; V -- publicly developed and rented without buildings; VI -- publicly developed and rented with buildings.

In District II a total of 37,351 feet of water was diverted of which 16,938 acre feet were delivered to the farmers, or 45.35 percent of the diverted water. This amount totals 1.80 acre feet per acre.

Most of this water, 59.5 percent was diverted in July and August, 1955, the rest being divided during the months of May, June and September. The cost of operation and maintenance per irrigated acre was \$4.01 for District I and \$5.50 for District II.

Up to date no repayment of construction costs has been made.

CHAPTER II

UNITED STATES IRRIGATION POLICY

Governmental policies concerning irrigation have changed over the years. As the West became settled the job of reclaiming the land passed from the individual, to the states, and finally to the Federal Government. These changes have, as a rule, been caused by the differences in climate and the progressive settlement from east to west.

Reclamation by the Individual

With the increase in population in the eastern states, settlers moved farther west to new territories. Under the Homestead Act of 1862, and its modifications over the years, new settlers were granted free land. These grants were subject to restrictions; the acreage granted was limited to 160 acres per person and the settler had to live on the land for five years prior to receiving title to it.

The Homestead Act worked well for the humid region, but west of the 100th meridian it broke down because of the difference in climate. One hundred and sixty acres in the humid region could support a family and was about all a family could handle under the techniques of the period. This was not possible in the arid region unless the acres were irrigated. Since settlers could not make claims for more land, they had to irrigate. Soon the land bordering streams and lakes was settled, and it became apparent that the man who controlled the water also controlled the land because the land without water was much less productive. As the land farther away from

the streams was progressively settled, more expensive irrigation systems were needed. By 1875 the Commissioner of the General Land Office, in a report to the President, indicated that settlers could not finance land reclamation as individuals and on their own land.

The Desert Land Act of 1877 solved the problem, at least temporarily and from the point of view of Congress. It required improvements on the land, and payment of \$1.25 per acre before title was granted to the settler. In spite of this, much speculation occurred so that a new or corrected form of the act became necessary.

In 1890 a modification of the Desert Land Act was passed which restricted to 320 the number of acres a single individual could acquire, and in 1891 a revision of the Desert Land Act was passed, covering almost all the acts under which land could be obtained.

"Respecting the desert land policy it was stipulated that improvements amounting to \$3.00 per acre, one dollar per year for three years, should be put upon the land towards its reclamation; that water should be available for the entire amount; that one-eighth should be put under cultivation; that persons might associate together in a project for watering their several entries; that only citizens of the state on which the land was situated were allowed the privilege of entry."^{1/}

This revision of the act did not solve the problems, however. In 1930 a commission appointed by President Roosevelt reported many abuses of the act. The clause concerning acreage limitations was side-stepped by a man and his wife each making a different entry. Many companies were formed under different names, but all under the control of one person.

^{1/} B. H. Hibbard, A History of Public Land Policies, The Macmillan Co., New York, 1924, p. 431.

The same water was used for different entries. Evidence accepted for backing claims was often very flimsy and mostly in the imagination of the claimant.

In 1915 a new act was passed by Congress, providing additional time to the settler who had already expended \$3 per acre in an attempt to irrigate his land and provided he could expect to accomplish his aim within the next three years.

Reclamation by the States: The Carey Act

The Desert Land Acts failed to meet the needs of the time. Some people believed that the lands should be granted outright to the states. The Committee on Irrigation of Arid Lands, created by the House of Representatives, reported that the consensus of opinion in the West was that the Federal Government would not irrigate the land. At the time there seemed to be two groups with different opinions concerning the irrigation of land. One group thought the Federal Government should irrigate the arid land. The group was not well organized. The other group believed that the land should be granted to the states to irrigate. In 1892 an attempt to pass a bill ceding the land to the states failed.

In 1894 a compromise measure between these two groups was passed. It was called the Carey Act in honor of Senator Carey of Wyoming, Chairman of the Public Lands Committee.

This act reserved a quantity of acres, not to exceed one million, to each of the states of Arizona, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington and Wyoming. If the states got these

lands settled, irrigated and cultivated, the Federal Government would grant the states patents for the land which could then be transferred to the settlers. By 1947, just over a million acres were patented for all ten states.^{2/}

"The Carey Act was not specific in stating the method of development to be used. The general plan has been for the states to contract with private construction companies for the building of irrigation works. The construction companies sell water rights to reimburse themselves for the cost of construction. The states are prevented by terms of the Act from disposing of the lands or using them for any other purpose than that of securing their reclamation, cultivation and settlement. Not more than 160 acres may be sold to any one person, and the sale may be made only by parties who have contracted for the purchase of water rights. In this way the land and the water are tied together."^{3/}

However, the financial provisions concerning Carey Act projects were its weakest points. The settler could not obtain the title to the land until he could show that the land was irrigated. But to construct the irrigation system, the settler had to have a large amount of capital because he could not use the land as collateral.

In general, Carey Act projects have not been successes. Neither were they a success soon after the act became effective, probably because there was not much need for irrigated farms.

An amendment to the Carey Act, passed in 1921, authorized the Secretary of the Interior to return segregated lands to the public domain under these circumstances: (a) if reclamation work is not started on the land

^{2/} Huffman, op. cit., p. 23.

^{3/} Huffman, op. cit., p. 22.

within three years after the land is segregated, or (b) if the land is not actually irrigated ten years after segregation.

In 1917 the State of California attempted to develop two irrigation projects -- Durham and Delhi. They have not be considered successes from the standpoint of cost repayment, but the circumstance under which they developed might be to blame. Prices broke in 1920 and the projects were designed for high income crops. Poor credit arrangements and inexperience also contributed to their lack of success.

Before the Carey Act was passed, a segment of public opinion believed that irrigation development should be carried out by the Federal Government. On June 17th, 1902, the Reclamation Act was passed, and with it the Federal Government initiated a national policy of reclamation.

Reclamation by the Federal Government

In general, the policy of the Federal Government has been not to interfere in irrigation development projects unless it is obvious that the people desiring to irrigate the land were unable to do so. It was not until 1902 that the Federal Government actually took an active part in irrigation development.

The part the Federal Government has taken in irrigation development has been motivated by a desire to provide family-size farms for settlers. In order to achieve this goal and to avoid speculation, restrictions have been set on the size of irrigated farms. In the selection of settlers, especially after World War II, preference was given to returning

servicemen. Finally, projects have been constructed in times of unemployment for relief work.

These aims were not accomplished with the first Reclamation Act of 1902. Although the Act of 1902 committed the government to the construction of irrigation projects, it said nothing about subsidies. It soon became apparent that the time set for repayment of construction costs was not sufficient.

In 1923 the Secretary of the Interior appointed a committee to investigate the problems of federal irrigation. This committee, known as the Factfinders Committee recommended:

1. That the 20 year repayment plan be abandoned and construction costs be repayed as a percentage of the yearly average revenue instead of a percentage of the total cost.
2. That if the costs of construction were more than the land could bear, adjustments could be made on the repayment schedule.
3. That relief be provided by Congress where needed.
4. That in the cases where the land could not repay construction costs, these costs could be suspended.

Other recommendations were made but only these four were adopted by Congress (in 1924).^{4/} On May 10, 1926, an act reviewing appropriations for new projects extended the repayment schedule for new projects to a period not to exceed 40 years. The Omnibus Reclamation Act of May 25, 1926, extended the 40-year repayment plan to all projects except in those cases where repayment contracts were already in force or were being negotiated.

^{4/} R. R. Renne, Land Economics, Harper & Bros., New York, 1947, p. 360.

In spite of the extended time for repayment, settlers had difficulty in meeting construction charges during the 1930's. On May 31, 1939, an act was passed extending relief to water users who were unable to pay construction costs. This act covered the year 1938 and previous years.

The Water Facilities Act of 1937 attempted to adjust irrigation projects to the climate and other conditions existing in the areas where projects are built. It authorized the Secretary of Agriculture to purchase the needed land or water rights, and to build either on public or private land small reservoirs, wells or dams. This authorization was based on the belief that these smaller facilities are more suitable to stabilize agriculture, which is mainly dryland farming or ranching, than the larger irrigation dams.

The Reclamation Project Act of 1938 became law in 1939. It attempted to give a solution to the many problems arising in federal irrigation projects. Its repayment policies might be called liberal. The repayment of construction charges was extended over a period not to exceed 40 years; the annual amount to be repaid would be determined on the basis of the value of current crops produced.

The Wheeler-Case Act might be considered a continuation of the Water Facilities Act insofar as policy is concerned. From the point of view of expenditures, it limited to \$50,000 the amount of federal funds which may be expended on a Water Facilities project. It also puts a limit of one million dollars on the cost of any project built under this act.

Under the Wheeler-Case Act the Department of the Interior is in charge of determining the feasibility of the project, building the project and delivering the water. The dams or other facilities are to remain the property of the United States Government. The repayment of "reimbursable costs" can be contracted by the Department of Agriculture with the landowners, once the project has been built by the Department of the Interior.

The determination of feasibility involves cost-benefit analysis. Legislation requires that the cost-benefit be in the ratio of at least 1:1, however, legislation does not specify how the costs or benefits are to be measured.

The building of projects (both in respect to time and location) also affect cost-benefit analysis, because both can vary with the fluctuation of prices in the whole economy. The ratio of benefit to cost has to be preceded by a determination of the value of both the benefits and costs. The method of determining this value is not prescribed by law. If only dollars are to be considered, it can be shown that, in many cases, liming or drainage in the humid region generally has a more favorable cost-benefit ratio than does reclamation by irrigation in the arid region.

The determining of costs not only involves dollars, but also alternative uses for these dollars. Much of the "costs" of construction in the Buffalo Rapids Project was money spent on relief jobs which cannot really be considered as project costs. Benefits are assigned not only to agriculture, but also to flood control, Indian lands and municipal

and industrial water users. When more than one beneficiary is apparent, the costs should be divided in proportion to the benefit received. In the Buffalo Rapids Project only agriculture is benefited directly. It would appear that the communities of Terry, Miles City, Fallon and Glendive are benefited indirectly.

The Wheeler-Case Act prescribes that no water shall be delivered until a repayment contract of reimbursable construction costs has been executed. The repayment is generally made to the United States Government through a water user's association or some analogous body. This repayment shall not exceed .40 yearly installments.

The development of the western water resources is now being considered from the standpoint of river basin development. After all, the water of the rivers is to be used for a multitude of purposes: irrigation, city uses, power resources, industrial uses, recreation, and flood control among others.

If the whole river basin is to be considered in the development of resources, then schedules of the benefits assigned to each group have to be taken into account in order to assign costs. The determination of benefits is further complicated by the fact that rivers cross state lines in which laws may be different. A beginning in the research needed is being undertaken by the Western Agricultural Economics Research Council. However, research findings will have to be legislated by Congress in order to have any effect on policy or progress of river basin development.

Reclamation in Other Countries

The idea of reclamation by irrigation is not new. It was practiced by the ancient peoples of Mesopotamia, Egypt, China and even the American Indians of Arizona.

At this time countries other than the United States are also attempting reclamation by irrigation. The conditions under which this reclamation is being practiced are very different from conditions existing in the United States: population pressure is also greater, the amount of land is more limited, the capital available for reclamation is not plentiful and the needs for more food and higher nutritional levels are almost critical.

The experiences of just two foreign countries will be considered here -- Italy and Spain. Both are Mediterranean countries, both have dense populations and in both the soil is poor and eroded except in the river flood plains.^{5/}

Reclamation by Irrigation in Spain

In 1939 a new bureau was created, the National Institute for Colonization.^{6/} It is comparable to the Bureau of Reclamation in the United States. The functions of the National Institute of Colonization are multiple, and have been assigned to it in successive laws. The idea of

^{5/} Emilio Gomez Ayau, Estudios, Vol. IV, Ministerio de Agricultura, Madrid, Spain, 1952.

^{6/} Instituto Nacionae de Colonizacion.

reclamation by irrigation was crystallized into a program of public works which private capital could not undertake. Together with these public works, a body of laws for the condemnation of private property and an educational program to facilitate the adjustment of new settlers have been developed.

The principal law used by the National Institute of Colonization is the Law of New Irrigation Projects.^{7/} It covers almost all aspects of reclamation by irrigation and, in some respects, might be compared with the Reclamation Act of 1902. The Law of New Irrigation Projects became necessary when it was evident that private capital was unable to carry on the development work needed to convert dryland to irrigation farming associated with the water facilities already constructed by the government. However, this law is applied under conditions of urgency while the Reclamation Act is not.

The building of the irrigation projects is planned to follow the rural pattern existing already in Spain. These projects are built following plans drawn by the government, but with either private or public funds. Three types of units are built: (a) the small family orchards which have a complementary character; something like part-time farming, (b) medium-sized farms which are self-sufficient and have a maximum area of 45 acres, and (c) large farms of a commercial character up to 312 acres.

^{7/} Ley de Nuevos Regadíos.

The projects are divided into three groups according to the benefits accruing from them (a) of general interest to the region, (b) of interest to the different watersheds, and (c) of private interest. Those of general interest are paid totally by the government, while the expenses incurred in the watershed works or works of private interest are defrayed 40 percent and 30 percent respectively by the government.

Some projects are built on land which was originally in private ownership but became the property of the state through forced sale. These farms pass through a five-year period of adjusting the farmer to the farm under the supervision of the National Institute of Colonization. The Institute will go as far as providing livestock, seed and machinery in the cases where it is needed. The settler will pay the Institute a certain percentage of the crops and livestock. This percentage is calculated so that after five years the new settler has paid off all the machinery and livestock plus 3 percent on the price of the land. After this first period the settler, if he has successfully kept up his duties, becomes the owner of the land which he repays in 25 or 30 years with 3 percent interest.

The settler repays for the irrigation facilities in the proportion of the total development cost allocated to irrigation without interest. He also pays for buildings and other improvements constructed by the government -- these last over a period of 40 years.

Reclamation by Irrigation in Italy

As in the United States, reclamation by the private landowner in Italy has not met with success. Apparently associations of landowners to protect the land from erosion, floods and other damages are successful, but when these associations attempt actual development and investment in order to increase production, the results are slow.

In 1950 a law was passed which should enable the government to develop new irrigation projects composed of family-size units. The source of capital has come in part from the Marshall Plan. This law is known as "Stralcio" and complements the general Law of Reform. Altogether the system is comparable with the Reclamation Act of the United States.

The application of this legislative body is accomplished by compulsory sale of the land. The government then develops and redistributes the land to individual settlers who have to belong to a development association for the first 20 years. These associations own machinery and marketing facilities which made the process of adjusting easier for the settler. After a period of trial, the settler begins repayments on the improved lands. This repayment stretches over a period of 30 years. The amount repayable will be no larger than two-thirds of the result of a sum total composed of two figures. One figure is the price of the land (at the government purchase price), and the other is the lien on the land accrued by the government improvements after the cost of these improvements has been reduced by a certain amount. Three and one-half percent interest is paid on the debt, and the law prohibits payments in advance.

The whole spirit of the law is based more on improvement of agricultural practices than on large public works.

CHAPTER III

THE PROBLEM

The development of irrigation farms and projects is the main problem in this thesis. This development could be approached from the point of view of time, situation and development methods. Time and situation will be touched very lightly because of the broadness of the topic. However, the development methods, within one project, and their relative success will occupy the major interest in this thesis.^{1/}

Some assumptions have been made which follow classical economic thought. No attempt is made to demonstrate their validity. The function of these assumptions is simply to delimit the problem in terms of the method used to compare the development of farms.

The first assumption is that farmers will invest profits into the farm business until the farm is well developed. This assumes that farmers are "economic men" and that they will choose to dispose of their income by investing in those alternatives which offer the greatest net returns. This assumption is closely related to one of the criteria for comparing success of development methods, that of capital accumulation.

To make permanency of residence a measure of success, it is necessary to assume that farmers are free to move at any time. It is questionable that this is always true.

^{1/} Only one project is being studied here. Secondary material from previous studies of this or other projects will be used, however.

A third and final assumption is that income, returns to investment and intangibles make life on the farm as desirable to the farmer as life away from the farm.

Bearing in mind these assumptions, the hypothesis may be stated: that the method of development has a significant effect on the success of the farmer, and that this success can be measured in terms of capital accumulation, permanency of residence and level of living.

To be able to prove or disprove this hypothesis satisfactorily, data on capital accumulation, level of living, and permanency of residence for each development class since Stewart's and Myrick's study^{2/} would have to be available, besides some qualifying information concerning them.

For capital accumulation, a figure representing the quantity is necessary. This figure is computed by determining the net worth change of the farmer from time of settlement to 1950. This change should represent what the farmer has been able to gain since settlement or since the project was last studied. However, it is of interest not to credit a very large increase in net worth to the development method when it has been due to windfalls of various kinds. In all cases these "windfalls" appear under the heading of "unusual receipts". These unusual receipts cannot be credited to the development method. Generally they have come from oil leases, sale of land for urban and urban-type uses. Data on capital accumulation is not available for farmers who have come and gone since the project was first studied in 1950. It would be enlightening to have this information

^{2/} This study is a continuation of the previously mentioned study by Stewart and Myrick.

to be able to determine what method of development has provided more income to farmers since 1950. It would also be of interest to determine where farmers have invested their increased net worth. If not in the farm, it would indicate that opportunities for further farm development have been exhausted or are poor alternatives.

The level of living under different development methods is of interest to make sure that settlers are not becoming farm owners at the expense of their level of living. Also the average level of living should be compared between methods of development. It would be of special interest to know the level of living of farmers who have left the project at the time of leaving. To measure level of living, the same scale used by Stewart and Myrick in 1950 is used.^{3/} This scale affixes values to different items which are supposed to indicate the level of living. They serve more as a class comparison than as a determination of actual level of living. In 1950 Stewart and Myrick found this scale satisfactory.

If farmers are not satisfied with their farm, they are more liable to leave. This is why permanency of residence is used as an indicator of success of the development method.

There are several pitfalls in associating the permanency of residence with the development method. Some farms, either because they are poor per se or because they have had a poor operator, acquire a bad reputation. This bad reputation brings poor operators so that an almost

^{3/} Clyde E. Stewart and D. C. Myrick, op. cit., p. 80.

continuous stream of new farmers passes through it. These farmers disinvest much of the capital accumulated in the farm.

The reasons why most farmers have left are still not known positively. In most cases the reasons given by neighbors or the project manager are available. In other cases the farmers themselves have been contacted if they have not left the area. Letters to several farmers who did leave the area have not been answered.

CHAPTER IV

THE DATA

Sampling

Whenever possible the same farmers contacted by Stewart and Myrick in 1950 were once more interviewed. There were two reasons for this, one to obtain some continuity in the study and the other for determining how many operators who were in the 1950 sample were still on the same farm. In the cases where operators had left whoever was operating the farm was interviewed. This should increase the sample size from the 62 interviewed in 1950 to a larger number because of the two alternatives: operators contacted in 1950 now on new farms, and farms that were included in the 1950 sample now with new operators. However, there were only four operators meeting the conditions of having been in the 1950 sample and having changed farms.

TABLE I. WHAT HAPPENED TO THE OPERATORS OF THE 1950 SAMPLE BY DEVELOPMENT CLASS, 1950-1955.

Development Class	On Same Farm	Not on Same Farm	
		Left Project	On New Farm
I & II	12	6	2
III	12	3	0
IV	12	4	0
V	5	3	2
VI	0	1	0
Total	41	17	4

Although the original idea was to take schedules from all operators interviewed in 1950 and from all operators on farms which were in the

1950 sample, this was not possible. There were two refusals, one operator was away, and four farms had changed operators in 1956 while two others had changed operators in 1955. The schedules taken from the operators taking over the farms in 1955 and 1956 are not much good for comparison purposes, because, as indicated in Chapter III, data collected referred principally to 1955 and 1956 crop years.

The method of selecting operators described up to this point gives a stratified (by development systems) randomized sample having the desired continuity with the 1950 study.

A new part of the project, the Fallon area, had water delivered to it for the first time in 1950. This fact made it ineligible for the 1950 study. It consists of 17 farms.

For sampling purposes the farms were divided into two groups: privately developed and government developed. Only one farm in the privately developed group was eligible because the other two were feed base units. Of the government developed group two were chosen because, supposedly, the government had constructed buildings on them. These buildings, as it turned out, were shacks for tools and machinery. Of the remaining farms, 12 altogether, a randomized sample of six with two alternates was taken. Both alternates were used so that the final sample for the area consisted of nine farms. This gave a sample density for the Fallon area of 53 percent compared with a mean sample density of 44 percent for the rest of the areas.

Interview Procedure

All data were collected by personal interview by the author during the summer of 1956. Several questions (machinery owned, liquid assets, acreage) are "as of now" which gives a two month spread to the answers. By this method not more error than by setting a specific date is expected and the situation is made easier both for the interviewer and the farmer.

In interviewing the confidence and cooperation of the farmers was obtained by assuring them that what information they gave would not be used for taxing purposes. Besides, their role and key position in this study was pointed out.

The schedules were almost the same as those used by Stewart and Myrick in their 1950 study. The order of the questions was slightly changed, and a whole section on pasture management was removed. The reason for changing the order was to leave a question concerning cash assets (stocks, bonds, cash, surrender value of life insurance) for the end. This question often annoys the farmer enough to affect following answers. The question on pasture was removed because it pertained to another study concerning pasture management. In spite of this removal the schedules had seven pages. Operators new on the farms were asked questions concerning their net worth at settlement but this information was not requested from the operators interviewed in 1950, because the schedules taken in 1950 are still available. Many farmers had difficulty in remembering how much they had when they settled, but generally it was not much. As a result there are two points in time which are probably more

reliable than the rest for comparing capital accumulation, standard of living, and permanency of residence -- 1950 and 1956. This does not mean that the information obtained from new settlers is completely unreliable. It merely indicates that a difference in reliability is expected, and that the schedules taken from the same farmers in 1950 and 1956 should be more accurate than those comparing any other two points in time. No attempt will be made to prove this.

Interspersed in the schedules are questions which give an idea of opinions farmers have of the whole project, of credit arrangements and of other facilities available to them and which may affect their success.

Permanency of Residence

Of the operators interviewed in 1950, 41 were on the same farm and four on other farms but still on the project. The remaining 17 had either left the area or were no longer farming.

TABLE II. DISTRIBUTION OF OPERATORS CONTACTED IN 1950, STILL ON THE SAME FARM IN 1956.

Development Class	1950 Study		On the Same Farm in 1956	
	Sample	Universe	Actual Number	Percentage of 1950 Sample
I & II	20	55	12	60
III	15	26	12	80
IV	16	40	12	75
V	10	17	5	50
VI	1	2	0	0
Total	62	138	41	66

This data indicates that for the project as a whole a 33 percent operator turnover took place in the intervening five years. However, this has been calculated from the point of view of operators remaining on the same farms.

Information gathered shows that more than one operator has worked some of the sampled farms since 1950. Two of these farms, one each from Classes IV and V, have had four changes in operator since 1950; and two other farms, one each from Classes V and VI have had two and three changes in operator, respectively, since 1950. The remaining 17 farms had a single change in operator since 1950.

These changes are not grouped in any particular year and both the spread and sample are considered too small to warrant a statistical analysis.

The farms which have had more than one operator are only four out of a universe of 21 farms which have changed operators since 1950. Therefore the reason for the frequent changes is attributed to the farms themselves rather than the method of development. Interviews with the operators on these same farms in 1956 confirmed this belief. The farms showed signs of poor husbandry in previous years and fences, ditches, and drainage were in need of repair.

Tenancy is often a reason for operator turnover. A tenant will be considered a man operating a farm which is not his own, be the owner, a private individual or the government. The mere fact that a man is working someone else's farm makes changes easier, both from the standpoint

of the operator who has no capital tied up in the land, and from the standpoint of the owner who may associate lack of revenue with the tenant. The data do not show a relationship between tenant turnover and total turnover. Of the 21 operators who have left the farms they were on in 1950, 10 were tenants and 11 were owners. This turnover, by development class and tenancy, can be seen in more detail in the following table.

TABLE III. OPERATORS OF THE 1950 SAMPLE WHO HAVE LEFT THEIR FARMS SINCE 1950.

Class	Tenant	Owners	Total
I & II	4	4	8
III	0	3	3
IV	0	4	4
V	5	0	5
VI	1	0	1
Total	10	11	21

The reasons for leaving could not be obtained from the operators themselves, except for the four who remained in the area. The four were tenants. One of them left because of disagreements with the owner of the farm and because he desired a farm of his own. Another left because the tenancy agreement did not provide him with enough cash. Apparently also the owner wanted all his farm in pasture so that there would be no need for a man to work the land. The two were tenants in Class II.

Another one had to change farms when all farms were sold by the Federal Government, because somebody else had precedence over this

particular operator. The farm was in Class V (developed by the government without buildings). And finally, another tenant in Class V moved to the Fallon area.

The assets of these four farmers show no particular pattern either in type or in net worth by development class. However, there is a high degree of correlation between net worth and value of machinery. Their net worth ranges from \$18,000 to \$95,000.

The 21 farms left by their operators were sometimes added to an already working unit, or were sold or rented as individual units. Seven of these farms were added to already operating businesses, four of which were dryland farms, and three irrigated farms. This indicates a demand for more land which might be caused by the price-cost squeeze of the past five years. Farmers find that they need more land on which they can use their machinery more effectively, the price of the machinery being in this way spread over a larger number of acres. This seems to defeat the purpose of smaller acreages for more people, and would suggest that the law concerning acreage limitations be revised to take account of other factors of production besides land. However, some managers seem to weather these price-cost squeezes successfully even on small acreages.

Although one of the ideas behind federal development of irrigation projects was to make farm ownership feasible to as many farmers as possible, a noticeable tendency exists for settlers, once they become owners, to rent out their farms.

Of the 21 farms left by their operators, nine have been rented out and 10 are operated by their owners. One farm is practically abandoned and no information is available concerning the other.

This tendency to rent seems to be fostered, on one hand, by farmers having units which they consider too small and which they wish to enlarge; and on the other hand by farmers who, for the same reason, want to rent out their holdings and find additional sources of income in some other places, while still being in a position to return to their farms if they desire.

Table IV gives the present distribution and tenure types by development classes, for the farms left by the operators they had in 1950.

TABLE IV. TYPE OF TENURE OF FARMS LEFT BY THE OPERATORS OF THE 1950 SAMPLE.

Class	Still Operated as a Unit		Attached to Another Farm Business		Tax Delinquent and Unknown
	Owned	Rented	Owned	Rented	
I & II	2	3	-	2	1
III	-	2	-	1	-
IV ^{a/}	5	-	-	-	-
V	-	-	3	1	1
Total	12		7		2

^{a/} Includes one rented with buildings.

It would be risky to draw any all-inclusive conclusions considering the size of the sample. But for the sample as a whole a tendency toward incorporation with already operating units is evident.

An analogous pattern can be seen in the purchases or renting of irrigated land in the last five years, by farmers who are still on the same farms they were on in 1950. The acreages in the following table are limited to irrigated land.

TABLE V. LAND PURCHASED OR RENTED BY FARMERS OF THE 1950 SAMPLE STILL ON THE SAME FARM IN 1956.

Class	Acres Bought (Average)	Number of Cases	Acres Rented	Number of Cases
I & II	68	4	28	1
III	53	1	0	0
IV	37	2	17	1
V	65	1	23	2
Total		8		4

One of the possible causes for settler turnover is the limitations of acreage available to them. In 1950, 18 farmers with an average of 122 acres per farm wanted more land, the average desired was 156 acres; and five farmers wanted less land, an average of 158 instead of 214.^{1/}

These differences in acreages desired have become accentuated in 1956. Two farmers were very specific, their wishes being a function of whether they could afford to hire a man or not. These farmers owned 123 and 215 acres respectively. They would like more land so that their farms would have 200 and 300 acres, thus being able to afford a hired man. Or, they would like less land, 80 and 150 acres each, so that one

^{1/} Two of these were "feed base units." See Stewart and Myrick, op. cit., p. 22.

man could handle the farms. These two farmers are included in the following tables.

TABLE VI. DISTRIBUTION OF OPERATORS WHO DESIRE MORE LAND, 1956 ^{a/}

Class	Number of Cases	Average Present Acreage	Average Desired Acreage
I & II	3	154	263
III	7	139	252
IV	2	130	237
V	3	145	203
Average of Acreages		142	238

^{a/} The present and desired acreages are averages obtained from the number of cases in Column 2.

TABLE VII. DISTRIBUTION OF FARMERS WANTING LESS LAND, 1956.

Class	Number of Cases	Average Present Acreage	Average Desired Acreage
I & II	2	279	110
III	2	190	120
IV	1	159	90
V	1	215	150
Average of Acreages		210	117

It is noticeable that the number of farmers wanting more land is almost double the number of those wanting less land. And if the two farmers who wanted either a larger or a smaller farm are not considered, then the number of farmers wanting more and less land is converted to 13 and four respectively.

This leads one to believe that the settler turnover can be caused by insufficient acreage. This insufficient acreage can lead to inefficient use of both machinery and labor.

Four of these units have become part of dryland farms. In other words they have become feed base units.

The other three farms, left by their operators, have become joined to other irrigated farms. The total acreage of each of these farms including rented and owned irrigated land amount to 492, 386, and 257 acres respectively, or an average of 378 acres. This also shows a tendency toward larger farms.

TABLE VIII. IRRIGATED LAND (BOTH OWNED AND RENTED) IN ALL FARMS INTERVIEWED, 1955.

Class	Number of Cases	Total Acreage	Average Per Farm
I & II	19	4,039	212
III	24	3,609	150
IV	16	2,154	134
V	9	1,868	207
Total	68	11,661	Average 171

This tendency to acquire more land is not a new development. Several farmers who acquired government-developed units either operated other units in connection with their owned small holdings, or rented more land so as to increase the total size of their farms. This indicates that farm sizes were not satisfactory to begin with, and makes the increase in acreage something to be expected.

