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B R A Z I L

WHY SOME FARMERS DON'T PAY WATER CHARGES?

by

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WHY SOME FARMERS DON'T PAY WATER CHARGES?

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Recent estimates indicated that the demand for food, fiber and bioenergy products is growing at an annual rate of no less than 5%. Historical evidences only support a growth of output of 1% that can be accrued to acreage increase, and, hence, the remaining 4% of output growth will have to obtain through yield increase.

The levels of yields are low in Brazilian Agriculture. For a period of ten year, one can expect the yields of the rain fed agriculture to grow at 2% per year. The ramaining growth needed will have to be provided by irrigated agriculture.

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Table 1 gives yield and acreage increases that are needed to face a demand growth of 5%, when the irrigated area varries and the yields of the rain fed agriculture are growing at an annual rate of 2%. To have an overall yield increase of 4%, it is necessary to expand the irrigated area by 3.5 million hectares, in ten years. The acreage increase, for the same period, will have to be of 4.4 million hectares, which is in agreeement with historical evidences.

Table 1 For a period of ten years, acreage increase required to face a demand growth of 5%, when the irrigated area varries and the yields of the rain fed agriculture are growing at 2% per year; and, also, the overall yield increase obtained. Area actually cultivated : 50 miilion hectares.

Irrigated Area (million hectares)	Acreage Growth Needed (million hectares)	Yield Increase obtained (geometric rate %)
1.0	13.3	2.6
1.5	11.5	2.8
2.0	9.7	3.2
2.5	7.9	3.5
3.0	6.1	3.8
3.5	4.4	4.1
4.0	2.6	4.5
4.5	.8	4.8
5.0	-1.0	5.2

Source: Alves, E (1986)

The growth of agriculture for the period 1979-84 was small in general, and, specially, for products like rice, edible beans, corn and manioc, which are in the basket of low income people. Percapita consumption of these products decreased. The imports of rice, edible bean, corn and milk increased, and reached high amounts in 1986. The overall expenses in imports of food in 1986 did not increase so much, because of the substantial increase in wheat production.

The government decided for an economic policy to support yield growth, which is, strongly, based in increasing the irrigated are.

CHARACTERISTICS OF THE IRRIGATION POLICY

There are three systems of institutional organization for irrigation in Brazil.

a) Private - The farmer or a firm takes the decision to irrigate and make the investments to implement it. The role of the government is only related to credit, road and electricity infrastructure.

b) Mixed - The government may associate to the private sector to build dams, pump stations,main channels and drains, and charges a price to water to recover the investments or it may lend money to the private sector at special interest rates and terms for the construction of the infrastructures.

c) Public - The government acquires the land, builds the infrastructure, selects the farmers, settles them and becomes responsible for the management of the irrigated perimeter. The management role includes elementary school, health, extension, water management, marketing of inputs and of agricultural products etc. The irrigation law divided the land into two parts: 80% of it are for small holdings - an irrigated area up to 8 hectares; 20% for larger farmers and private firms. For the the first part, the on farm irrigation facilities are

also built by the government. For the second part, the government provides only water at the gate of the lot. In some special conditions, the split may be 50% for each part. Government collects two types of charges: one linked to land to recover the expenses made to acquire it and to build the on farm irrigation and housing facilities; the other is a water charge, which is explained below.

Most of the irrigated area in Brazil is private, very little mixed and public. Out of 2,0 million hectares that are irrigated, the private system accrues for 1.93 million hectares.

The new policy aims at irrigating an additional area of 3 million hectares until 1990. One million hectares will be in the Northeast, the poverty stricken region, and two million hectares will be located in the ramaining of the country. Public irrigation will be in Northeast only and, even so,up to. 2 million hectares (20% of the program).

The idea is that farmers and firms are able to find out the areas that have lower cost of irrigation, taking into account factors of location and existing infrastructure, and, also,they are much more efficient to make the investments. They can select areas that are small and medium size, and well located.It is difficult for the government to work with small areas. This choice alows the country to move from the locations that require less investments per hectare to the ones that need more.

To implement the program the government created the Irrigation Secretary, with a Ministry in charge of the program. The irrigation policy contemplates credit at special interest rates and terms, a huge training program that includes farmers, agronomyst, engineers, etc and the support to the universities and research institutions in the area of irrigation.And, also, investments in infrastructure such as roads, electricity, dams, pumps stations, etc.

The program encompasses all classes of farmers, and whenever there are subsidies in comparison with the well-to-do agriculture of southern Brazil they are for the small farmers and for the Northeast only.

In the context of Brazilian Agriculture, the water

charges present a problem that is less relevant, because most of the irrigated area is private and will be so.But it is important enough to merit a serious discussion.

THE WATER CHARGE QUESTION

The perusal of the literature indicates a great concern with three questions: should there exist water charges at all? If so, what should be the levels? and, finally, how should they be calculated? (Duane, 1975). The literature concern is with economic efficiency: to avoid waste at farm and macroeconomic levels. The first questions is answered positively; the second one is a much more complicated.Subsidies are accepted, specially, to help the small farmers. But there is no clear indications as to how much and how long should they last. It is accepted to charge higher rates to large farmers, a recommedation that is very difficult to implement.

From the practical point of view, "Cost Recovery" is the only method that survived to calculate the water charges.

It indicates a monthly amount that if paid,for a given period, all costs are recovered: investments, operational and mantainance costs. It is a finantial concept that may have no relation to the economic value of water.

CODEVASF (The Company for the Development of the São Francisco Valley) uses the following procedure:

$w = k + v$ (1)

w, k and v are expressed in Cz$/m³

w = water charge

k = fixed costs

v = operational and mantainance costs

k is calculate as follow:

a)the government establishes the number of years it wants to recover the investments: 50 years.

b) The value of the infractructure of irrigation is calculated. They include pumps tations, dams, roads, channels, drains, electricity for pump stations,services and headquarters buildings. Interest rates are not charged.

c) The value obtained in (b) is divided by 50, and then by the amount of irrigated hectares of the project.

d) The amount obtained in (c) is divided by the amount cubic meters planned for the year, and, finally, by 12 to arrive at a monthly figure that is the value of k. Actually k is charged in Cz$/hectare. The bill sent to the farmers contains two values: operational and manteinance value in cubic meters-that is v; k in Cz$/hectare.This procedure is going to be changed to the described one.

Note the time dimension that is embodied into the concept of k. It is an average that if paid each month recovers the cost of the irrigation infrastructure. But the value a particular farmer pays for a period can stay below the avarage, if later he compensates for the difference.

It is possible to modify formula (2) to accomodate subsidy or tax:

$w=a.k+b.v$ (2) $a \geq o$; $b \geq o$

Subsidy: $(a-1)k+(b-1)< o$

If $o< a < 1$; $o< b < 1$, the inequality is true.

Tax: $(a-1)k+(b-1)v$ o. for $a \geq 1$ and $b > 1$ the inequality holds.

To set prices for each class of infrastructure is not an ease task. Frequently,rules of thumb must be used for the lack of something better.

The other charge is a land charge. It includes for the small farmers the value of land. The disapropriation value and every infracture built on the lot for individual use. For otner farmers, only the value of land is included, since they receive the water at the lot gate and build the infrastructure by themselves, without help of the government. The small farmers pay the land charges in 25 years. The first payment is after 5 years. The period for the other farmers is 12 years, and the first payment is after 3 years. The land charge is monthly paid.

The urban infrastructure is not charged: it includes schools, hospital, cemiteries, water and sewerage systems. The houses are on the land charge.

The literature bypasses the major issue of the paper. Why some farmers don't pay the water charges? Except for the case where w=o, the problem to receive them from the farmers is ever present.

CODEVASF is responsible for 46 thousand hectares of irrigated area that are distributed in 18 projects along the São Francisco Valley. There are 3800 small farmers. Each family is setlled in a lot that varies from 4 to 10 hectares. The total number of farmers is aproximately 4000. The number of farmers that are failing to pay the water charges is around 30%.

The projects are located in a region with a very high potential to agriculture, except for inadequate rainfall and the distribution of it during the year. Conditions for irrigation in the São Francisco Valley are excellent.

REASONS FOR THE FAILURE

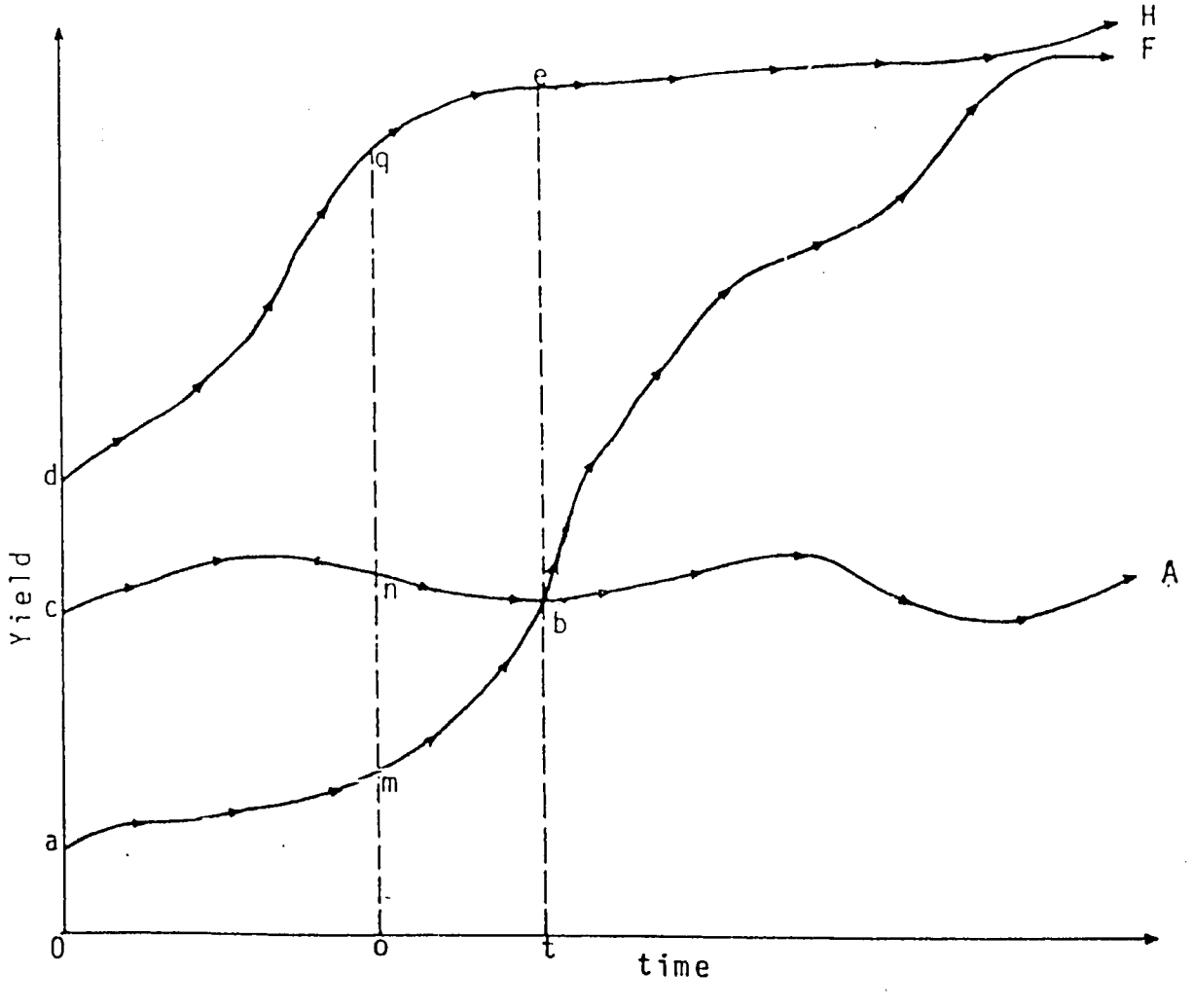
Most farmers are honest people. A negligible minority fails to pay water charges because of lack of moral principles.

This minority is to be handled by CODEVASF norms that are based on the irrigation law. Medium size and large farmers are similarly handled, when they refuse to pay water charges. What is lacking is a good set of criteria and procedures to identify the dishonest farmers, and, sometimes, the will to take action against them. They have the power to spoil the good ones.

The analysis is limited to small farmers that failed as producers. And this failure is the reason for the lack of payment. In CODEVASF case, they are the great majority of the 30% ones that don't pay water charges. To understand the problem,let's see how the project starts and develops. A site is chosen for the project. The land is disapropriated. The constructions are carried according to what was planned. The farmers are recruited and selected. Those that lived in the disapropriated area receive first priority in the selection process.

The farmers that were selected lived in the disapropriated areas or in areas close to them. They don't have experience with modern agriculture. They are unfamiliar with modern inputs such as fertilizers, machinery, and they have very little experience with credit, marketing and farm management.Most of them are almost elliterate or with a very low levels of schooling. But, among them, there are some bright people that are able to achieve very ligh standards of farming. The consumption set is very limited,and need be enlarged to stimulate the family to work more and to wish more income.To bring this group of farmers to modern agriculture represents a great challenge, and most of the existing problems are connected with training processes.

GRAPH 1: LEARNING PATHS



Graphic 1 indicates three types of paths:

Path H is the path followed by the best 5% farmers. They start at a higher level of productivity and soon after reach a plateau, after then the growth of yields slows down.

Path A represents the minimum level of productivity that gives condition to farmers to pay the water charges. It covers production costs, other than water charges, and the subsistence expenses of the family. What is left of income is just enough to pay the water charges. Savings are negligible.

Path F represents a typical farmer. He starts at a low level of yield, below Path A. He moves upward as he learns. At time t, he is able to pay water charges. He keeps moving upward, approaching the path of the best 5%.

A learning scale can be constructed, based on productivity data.

$$r = \frac{\text{productivity of the farmer}}{\text{productivity of the best 5\% farmers}}$$

At $\underline{o}$, $r = \frac{on}{oq} = 1 - \frac{nq}{oq}$ $o \leq r \leq 1$; closer r is to 1, the better it is.

$(1-r)oq = nq$. This represents a loss per hectare to society. In other words, it is the amount that a hectare does not produce, because it is not farmed by the best 5% farmers.

$R = \sum_{i=1}^{N} (1-r_i)/N$ $o \leq R \leq 1$. The maximum value for R is 1 and the minimum o. The best situation is for R=o, when r is one for every farmer. This is a measure for the project.

The path A moves upward whenever water charges increase and dawnward when they decrease. The training period, Ot, increases or decreases with water charges. Since we claim that most farmers that don't pay water charges are yet in the training period, Ot, the level of them has a great influence on the lack of payment. If there is a land charge, path A reflects it. We maintain, however, the terminology water charge to encompass both water and land charges.

Farmers of the region may be very much backward. In this case, it is advisible to settle competent farmers from the advanced areas of the country to serve as demonstration effect. The reliability of the scale to measure losses to society improves.

Graph 1 indicates that the training period ends at t, and lasts for the period Ot, which can be shortened by improving selection procedures and the training processes.

In the training period, water charges cannot be paid. They can be included in the land price to be paid later or, even, considered as training cost.

During this period, the typical farmer is vulnerable to a death sequence to bankruptcy. He takes his first loan to finance the crop. His ability to handle irrigated agriculture is yet very low. Worse than that is his managerial capacity. To make short the story,he obtains an income that does not give him conditions to pay back the Bank.The bank,which belongs to the government, has nothing do to recover the loan, since the typical farmer is poor and the land also belongs to the government Next crop the typical farmer learns that he cannot borrow anymore, and, hence,he goes back to traditional agriculture, from where the government was trying rescue him. He farms the irrigated land without modern imputs, with yields even lower than rain fed agriculture that is close by. He just do one crop a year, during the raining season, to save water costs, and, finally, he cannot pay the water charges.

The way out of this death sequence is to improve the selection and training processes. The investments on this phase have a high rate of return. The supervision need be much closer to follow the farmers in every step to avoid serious mistakes. It is also the time to identify and eliminate those that are unable to learn irrigated agriculture or that are dishonest.

We have discussed one reason of failure to pay water charges: the lack of recognition that there is a training period that may last for some time.

A second major reason is the way the perimeter is managed. The government is responsible for every thing: pump stations, drains, main channels, water management, extension, school, health care, etc. There is no participation of the farmers on the management of the project. Paternalism is the key word.

The farmers are subjugated by an authoritarian structure that gives them very little chance to defend their own interests or to criticize the government when it fails, by providing poor quality services. With time, they develop an atitude that is unfriend to management, and lack of cooperation prevails.

Management looses the respect of the community, and, consequently, cannot have the support of it in actions againt incomperent farmers or against incompetent extension agents and other public employees that are protected by the power structure.

The solution to this problem is to emancipate the project. This means to transform the farmers in the managers of the project since the beginning of it. It is necessary to create an association that elects the farmers that will form the board of directors. This board of directors will have the participation of the government but never to the extent to become a majority. The roles are set to give more and more responsability to the board in managing the project up the point that the government is not needed anymore.

With this systems, the responsability for high quality management shifts to the farmers, and they will exercise much closer supervision over every action that happens in the project. The cost is much less for the government.

If there is a reliable cooperative it can substitute for the board. Another crucial point is that resources must be accumulated so as to mantain the irrigation system properly functioning and that is one important function of the board of directors. On the contrary, the project will be continuously

dependent on the government for resources.

The third reason is the quality of extension worker. The extension agents have little experience with irrigated and modern agriculture. Their training is crucial to the sucess of irrigation and this involves special courses, seminars,visits to research institutions and advanced farmers. Whenever possible, it is interesting to have the participation of private firms that are specialized in extension.

Research Institutions must also be present at the project to train the extension agents and to solve problems that require specialized knowledge. It should have research projects designed to measure the parameters that are peculiar to irrigated areas and to solve problems posed by irrigation.

There is a tendency to atribute to lack of credit as being the main reason for failure of farmers,and there is merit in this remark.The farmers that were settled,don't have enough savings to support even a crop,and, hence, without credit they cannot modernize agriculture.But if the recommended techonolgy is not the right one, the farmers may lose money or they will have smaller profits. In the sequence of years they will not accumulate saving or wealth to the extent needed to give them resistence to the fluctuations of prices and to crop failures. The accumulated savings cannot finance the next crop. If the Bank system is rationing credit at the given interest rate, they go back again to tradional agriculture.

Credit and the right choice of technology go hand in hand. They must be properly adjusted to obtain optimum profits.

Another point connected to the extension worker is the quality of inputs that are sold to farmers. In a systimatic way, it is necessary to collect samples and submit them to analyses , for quality control purposes. When this is not done, farmers buy inputs of poor quality, yield are seriously affected, and, consequently, profits decrease or may fail to exist. Among the inputs are seeds, fertilizers, and insecticides. Machinery and equipment must also be checked by specialized firms or by government agencies.

There are also the channels, drains and on farm irrigation equipment that must be properly functioning if optimum yield levels are to be reached. Their correct functioning is a preconditon for the extension work. Water has to be available at the right amount and time. If he existing amount of water is less than the quantity demanded, then special devices to save water must be found. Water charge increase is one to them. But before this be applied ever effort should be made to avoid waste of water.

Marketing is another important point. It covers inputs, storage and transport. The solution found is to stimulate the development of cooperatives and the agribusiness. The experience with cooperatives in backward regions is not a succesful one, because of the excess of paternalism of the government. Inspite of this, it is a solution that have to be tried for the lack of a better one.Whenever there is room for agribusiness it ought to be stimulated.

The Brazilian experience shows that the association of small farmers with medium size, large farmers and firms is a very positive one. Care should be taken to set a limit to size, and the upper bound may be 300 hectares, and to have most of the land for small farmers. Our irrigation law requiries 80% of the area for small farmers, and this limit can be reduced to 50%, if approved by the Ministry of Irrigation.

Clearly, the overall economic policy has a large influence on the sucess of an irrigation project: credit, support price and export policies are the most important ones. They are not discussed to keep the paper within reasonable limits.

CONCLUDING REMARK

The paper stresses two points. The first point is that irrigation is necessary to sustain the growth of Brazilian agriculture and, hence, the government has decided to irrigate 3 million hectares until 1990. The Northeast region benefits from 1 million hectares and the other regions of the country will be contemplated with 2 million hectares. Public irrigation is present only in the Northeast region, and, even so, to extent of 20% of the government goal.

The second point is that the lack of payment of water charges is synonymous to the fact that farmers fail as producers in a broad sense.The recovery of water charges will improve only if farmers become more competent. A set of measures to reach this goal were proposed and discussed.

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APPENDIX A:

TABLE 2: WATER CHARGES
1986

PROJECTS	K US$/HA/YEAR	V US$/1000 m³
Gorutuba	4,81	1,48
Pirapora	20,80	9,57
Estreito	8,56	4,18
Ceraima	8,56	4,18
Piloto Formoso	8,56	4,18
S.Desidério/B.Sul	12,07	2,21
Curaçá	7,36	3,83
Maniçoba	7,36	3,83
Tourão	15,20	2,63
Mandacaru	9,81	2,84
Bebedouro	9,81	5,58
Nilo Coelho	4,90	3,83
Petrolândia	7,36	4,23
Propriá	8,44	1,98
Betume	8,44	1,98
Cotinguiba/Pindoba	4,22	0,99
Itiuba	8,44	1,98
Boacica	4,22	0,99

Source: Prepared by José Bento Correa from CODEVASF.