THE IMPACT OF THE RURAL WATER PROGRAM IN TANZANIA

by

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1972 11 16

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The decision to supply the whole rural population with safe and wholesome water within the period of less than 20 years is one of the many steps to create better living conditions for the people in Tanzania. This decision can be seen as a part of an overall socialist strategy to bring equal social service and economic opportunities to all people in the country. Investments and service will thus be spread as even as possible to the different regions in order to obtain regional equality. Better service, such as schools, dispensaries and water supplies will also allow for a more efficient pattern of permanent settlement.

NATIONAL OBJECTIVES

Apart from the political objectives, regional equality and an efficient pattern of settlement in ujamaa villages, the provision of adequate water to rural areas is of high priority on both social and economic grounds. Water is therefore extended to all as a free commodity.

According to the five year plan an improved water supply will lead to the following socio-economic benefits:

- it will be an important input into agriculture,
- it will be an important input into livestock industries,
- it will release labour consumed on carrying water for other productive activities,
- it will create better health,
- it will create better convenience.

The highest priority should be given to low cost projects which provide benefits to maximum numbers of people. The maximum spread of benefits will be achieved by an emphasis on inexpensive schemes, mobilizing self-help efforts of the local people. One of the benefits is thus also the short-term employment effects as well as promoting the sense of self-reliance, local initiative and decision-making within the villages.

In this paper we are going to make an effort to assess how these policies have been carried out in practice and how the objectives have been met within the Tanzania Rural Water Supply Program. The political, social and economic objectives and the prerequisites to obtain these objectives will be studied. The analysis is limited to water supplies primarily intended for domestic use not including those for irrigation purposes.

TARGET GROUPS

The target group was not specified in the first five year plan. According to WD & P estimates in November 1968, the ultimate objective was to supply the whole population within 40 years. It was also estimated that 250.000 persons would be supplied annually. In the new Government policy announced by the end of 1970 the ultimate objective was changed to supply all people living in rural areas of mainland Tanzania with adequate and safe water within the next twenty year period.

In November 1971 the Government was asked by the party to shorten the implementation period. More than 20 million people in the rural areas are still to be reached within the period. The numbers of people to be served annually should therefore be raised from 270.000 in 1971/72 to 1.100.000 in 1975/76 and onwards. (see fig. 1)

Empirical results

No exact record is kept on how many persons actually have been served. The number is estimated either from the total cost of the program or from the pre-feasibility studies. During the first five year plan period it was estimated that 300 - 400.000 people were served. According to different estimates 1.100 - 1.250.000 persons totally were thus served with water from new supplies at the end of the first five year period.
WD & P estimated the total number of people served to be 1.440.000 in 1971. In 70/71 200.000 and in 71/72 270.000 additional people were served.

POLITICAL OBJECTIVES

a) Regional distribution

Before 1965 allocations of Government finance for the development of rural water supplies were based almost completely upon the ability of the local authority to raise its share of project costs. As a result, project development tended to be concentrated in the wealthier districts. Even after 1965 the distribution of actual projects continued to favour the better developed regions where the Water Ministry had a large work capacity.

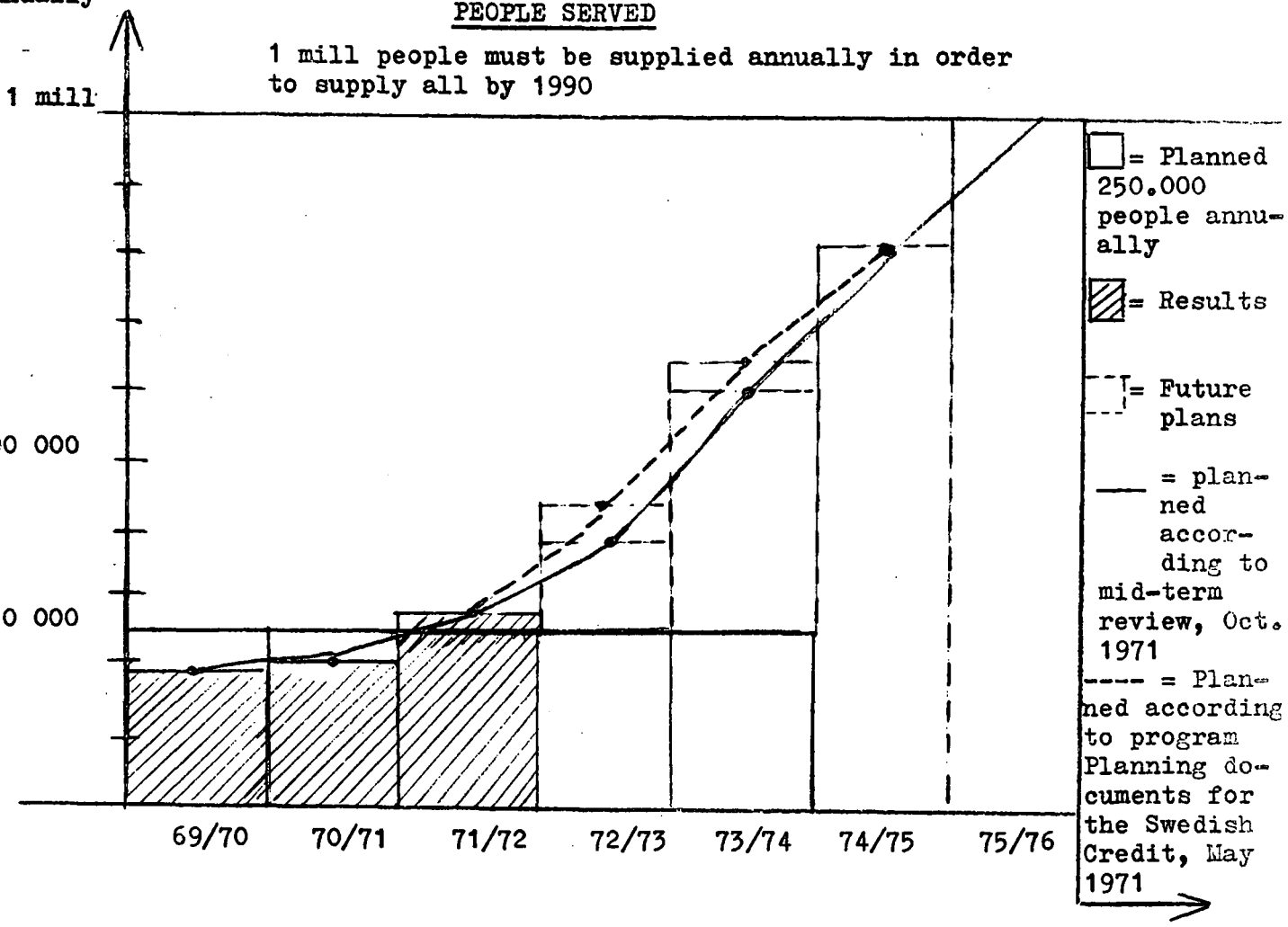
A new system was formulated by WD & P for the 1969/70 financial year and onwards to create regional equality. It allocated investment on the basis of regional population totals, livestock totals, livestock carrying capacity and the past distribution of funds. The resultant total of people and livestock still to be provided with improved water supplies in each region is converted to regional distribution factors.

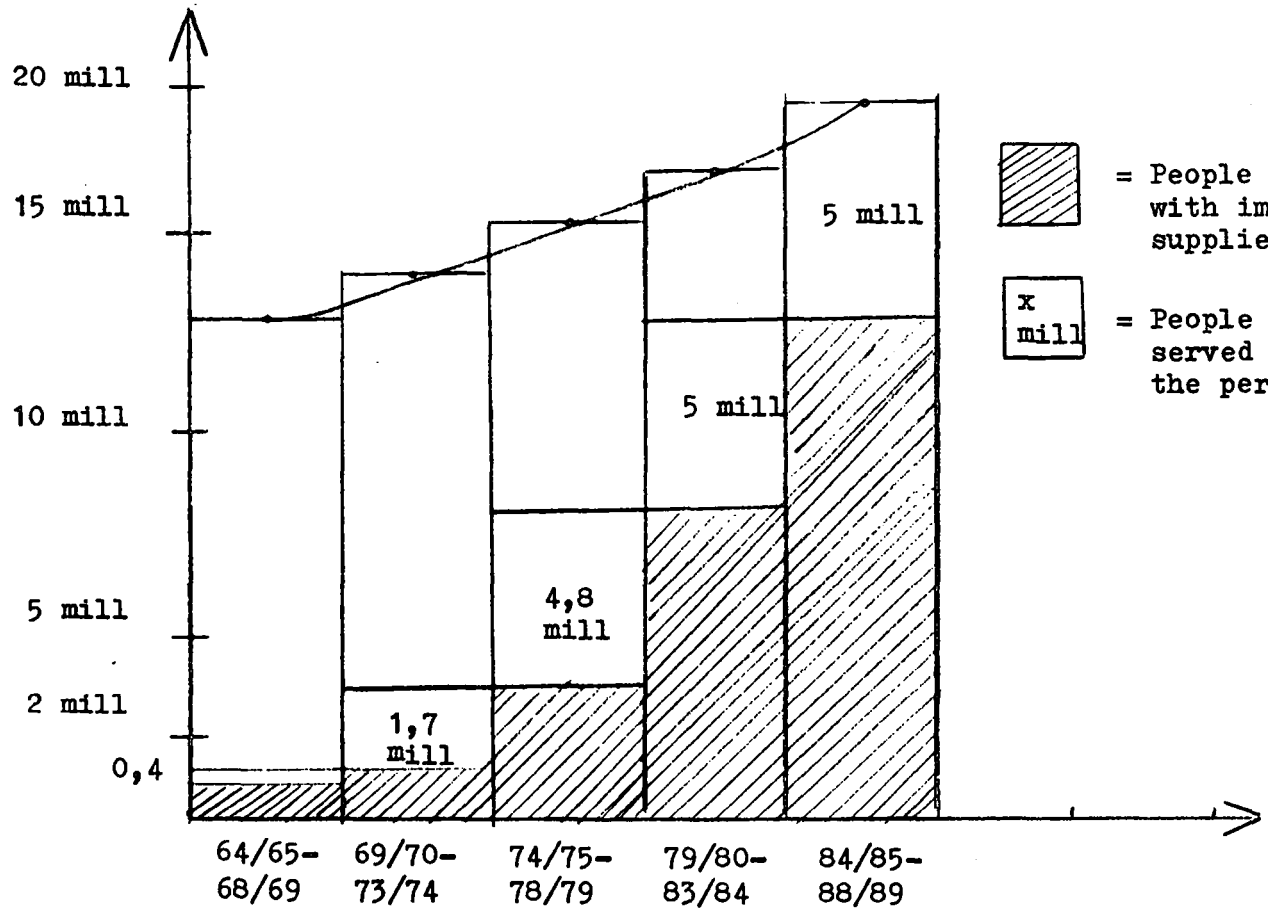
Fig. 1

People served annually

PEOPLE SERVED

1 mill people must be supplied annually in order to supply all by 1990





Empirical results

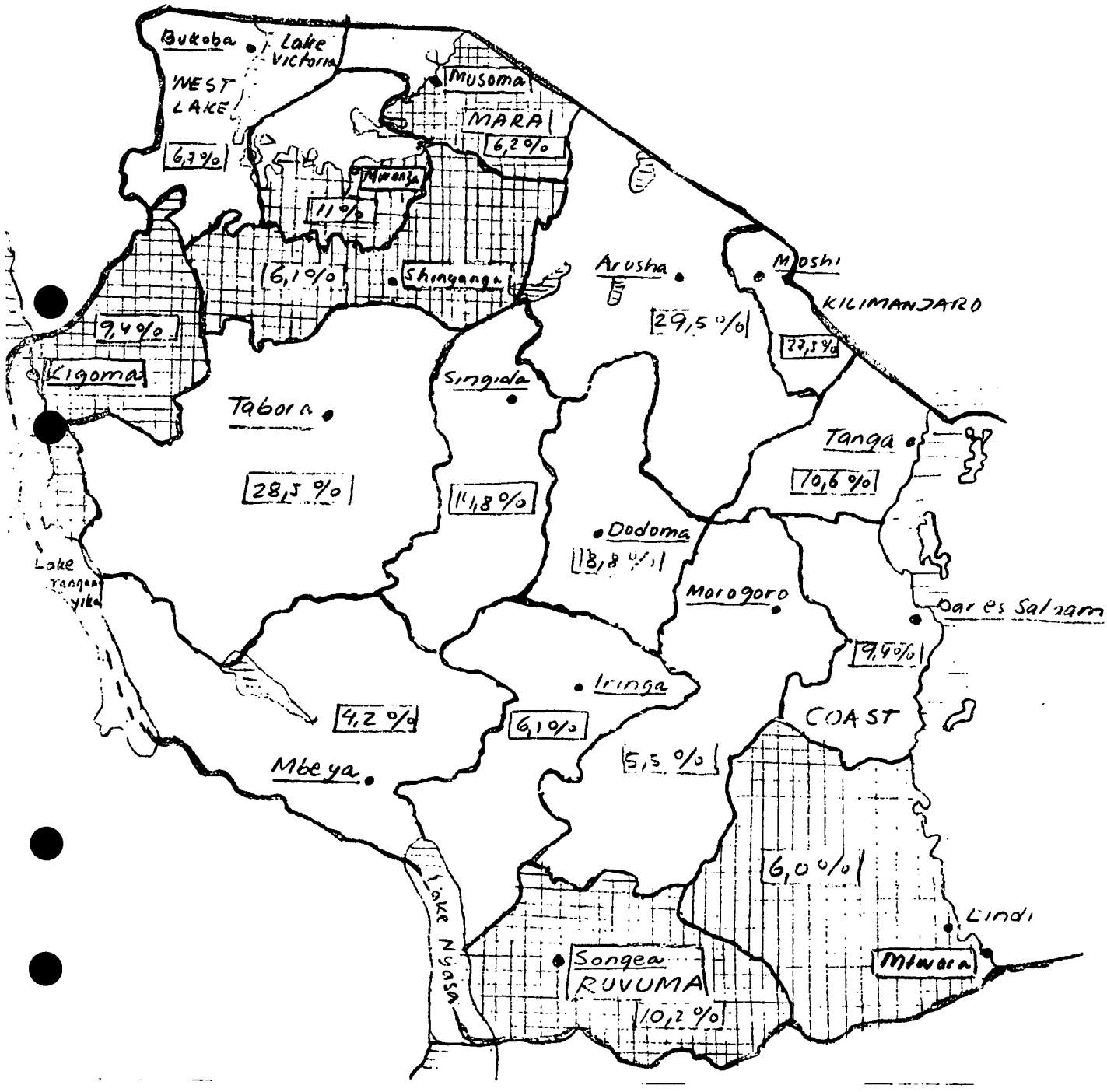
Allocation of funds has not been made according to the regional distribution factors as can be seen from fig. 1. The distribution is still largely affected by the work capacity in some regions, i.e. coast, Dodoma, Kilimanjaro, West Lake and Arusha regions. Dodoma has not previously shown a large production capacity but has been given priority because of the Ujamaa program in that region. On the other hand, some regions, notably Shinyanga, Mtwara and Mwanza, have got less than intended, making the distribution even more unequal between the regions. (se fig.3)

Fig. 2.

	Percentage of investments. Regional distribution factor	Actual investments 69 70 - 71/72	Deviation from the plan 69/70 - 71/72
Mwanza	9,5	5,3	- 4,2
Shinyanga	9,0	3,8	- 5,2
Mbeya	9,0	9,1	+ 0,1
Mtwara	7,7	2,6	- 5,1
Iringa	6,2	5,4	- 0,8
Dodoma	6,2	11,8	+ 5,6
Tanga	6,2	5,1	- 1,1
West Lake	5,7	9,8	+ 4,1
Arusha	5,6	9,2	+ 3,6
Morogoro	5,3	3,7	- 1,6
Kilimanjaro	5,0	9,8	+ 4,8
Mara	4,9	2,2	- 2,7
Tabora	4,6	3,9	- 0,7
Singida	4,2	3,7	- 0,5
Coast	4,1	13,6	+ 9,5
Kigoma	3,8	0,5	- 3,3
Ruvuma	3,0	0,3	- 2,7
	100,0	99,8	

REGIONAL DISTRIBUTION

Fig. 3



= Regions with considerably less funds allocated than planned (se fig. 1)

b) Formation and growth of villages

A major policy issue with regard to the provision of water is to allow for a more efficient pattern of settlement and to transform rural settlements into ujamaa-villages, with improved water supply as one of the main incentives. In the Second Five Year Plan improved water for the Ujamaa villages was only one of the few criterias for the sites of the new supplies. According to the Annual Plan 1971/72 - 1972/73 Ujamaa villages were to be given first priority for the water schemes in most regions.

Empirical results

Two approaches have been used to find out if water is one of the main incentives in the formation of new villages. Farmers have been interviewed about their attitude to water in relation to other factors which might motivate people to change their place of residence. Analysis of changes in settlement in response to installation of standpipes has also been made.

The overall conclusion from these studies is that water is not a sole or primary motivating factor for moving to or from a village, but that it is one of several items which make people decide to settle in a particular place. In a study on Eastern Handeni people had moved to the newly built road some years ago in large numbers in spite of very bad water supply conditions. Besides the road some of the main reasons for the move were economic opportunities, proximity of relatives or marriage, and availability of good land to cultivate. These observations were supported also from Nzega and conclusionsmade by White et al, both of which suggest that water is not the main factor in determining the location of settlement.

c) Self-help schemes

As expressed in the five year plan the maximum spread of benefits will be achieved by an emphasis on inexpensive schemes mobilizing self-help efforts of the local people. This will also promote a sense of involvement and responsibility towards the projects.

Empirical results

WD & P in Tanzania has not utilized the employment of self-help labour because of the problem of lack of control over the workers and the difficulty of preparing firm planning schedules for materials, equipment and personnel. On most water supply projects, WD & P provides all materials, transport, labour, supervision and maintenance, and no local contribution is required or solicited. There has been some utilisation of self-help labour on small schemes, but generally these projects either are financed by the local Regional Development Fund, or are constructed in

this manner at the discretion of the Regional Water Engineer. Where self-help projects have succeeded, the initiative for the scheme came from inside the village rather than from the outside. So far self-help schemes have mostly been executed by non-Governmental organizations.

The Community Development Trust Fund has been promoting simple, hand dug wells with hand pumps. During 1962-69, the Fund has helped in installation of 745 water wells through Tanzania. The average amount of assistance provided by the Fund for these wells varied between Shs 1000 and Shs 1600.

In late 1966 the Kibaha Health Centre set up a program of small water supplies for the immediate area around the centre. Two types of protected water wells were constructed under the program: hand dug wells utilising concrete well rings and hand bored wells utilising concrete culvert pipes. Each well was supplied with a cover and a hand pump. Materials and construction supervision were provided by the Kibaha Health Centre with the assistance of the Rural Development Officer, and the villagers provided the necessary self-help labour. Excluding labour costs, dug wells averaged about Shs 230 until 1969. A total of 48 wells have been completed since 1966, while another 10 are under construction.

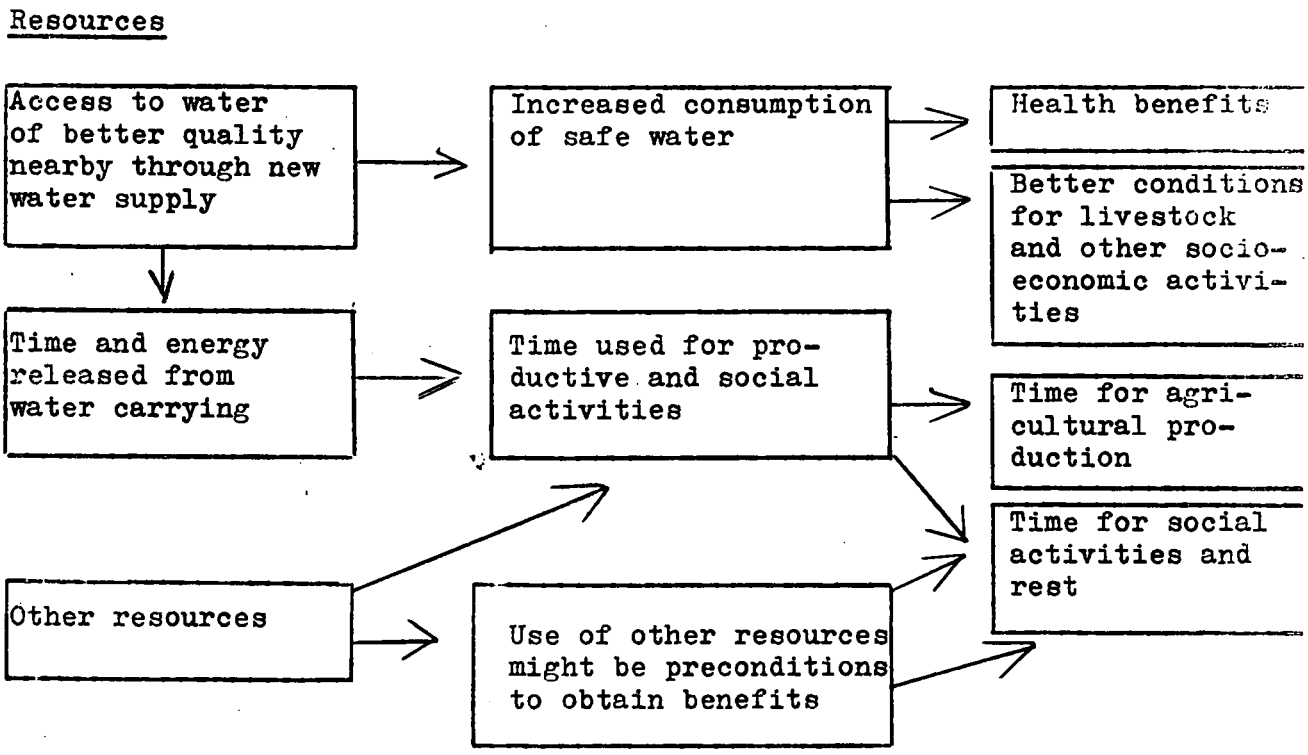
For Mayo village the self-help works were preceded by 3 months of long discussions and practical trials. The necessary work was already distributed and organized among the villagers when the pipes arrived. Cement and fittings were bought with contributions of the villagers and local craftsmen assisted in fitting the pipes. All building works were done by local people according to their suggestions. Each group of 10 houses were provided with a tap. A cooperative field was started with water for irrigation supplies by surplus water.

Several improvements have been noted as a result of these projects. During the construction work about ten men from the village were trained in fitting pipes and handling the necessary tools. This on the job training had the effect that the responsibility for maintenance and control of the project ended the monopoly held by one craftsman.

The water projects have initiated the production of bricks on a larger scale. Since water is available in necessary amounts the year around bricks can now be produced also in the reliable dry season.

PREREQUISITES FOR SOCIO-ECONOMIC BENEFITS

In order to obtain the economic and social benefits an increased quantity and an improved quality of water as well as near access to water for the inhabitants must be provided. It is not enough to contend that there is water available. It must also be made clear how this resource is utilized and how the time released from water carrying is used in reality. There are no clearcut connections between resources, use of resources and intended benefits as expressed by the five year plan but an attempt to relate them is done below. In many instances, however, a good water supply is not itself enough to create the intended benefits. The picture is therefore supplemented with other resources which must be used as inputs in order to obtain maximum benefits.



1. Water quantity

In order to avoid excessive investment costs, design criteria should be adopted to present and future estimated consumption.

WD & P has used a technical depreciation period of 10 years and an estimated population increase of 50% during that period to establish the following design criteria:

- The source of supply and pumphouses, pumping mains and distribution mains are designed for an estimated population in 10 years at 30 litres per head and day,

- the consumption rates for cattle and large animals are 15 litres per animal and day.

Actual consumption

The results from several studies of water use from traditional and piped sources relating to Tanzania are summarized in table 2. The average consumption from traditional and piped sources are 14 and 17 litres respectively. Only water carried from the source to the dwelling is measured.

Fig. 4

DAILY WATER USE PER CAPITA FROM TRADITIONAL AND PIPED SUPPLIES

Type of Supply	Name of investigator	Location	Number of sites	Daily water use per capita in litres average
TRADITIONAL	White et al, 1969	East Africa	19	11,2
	Warner, 1969	Tanzania	21	12,7
	Tschannerl, 1971	Handeni	3 areas	13,3
	Arithmetic Mean			12,7
PIPED	Warner, 1969	Tanzania	11	14,1
	Heijnen, 1971	Lushoto	1	17,8
	Yoshida,1971	Rufiji	1	17,8
	Ferster, 1969	Nzega	6 areas	18,7
	Arithmetic mean			17,1

Fig.5

AVERAGE WATER USE PATTERN BEFORE AND AFTER TAP INSTALLATION

by D.Warner, 1969

Village and District	Quantity (litres)		Time used (hours)	
	Before	After	Before	After
Kwakoa,Pare	5,0	9,5	7,3	0,6
Mdawi, Kilimanjaro	11,0	14,5	1,6	0,7
Msaringa, Kilimanjaro	10,5	11,8	5,1	2,0
Mlala, Morogoro	15,5	18,8	3,0	0,4
Pangawe, Morogoro	13,2	17,7	1,7	0,3
Bungu, Rufiji	21,0	22,7	2,6	0,5
Arithmetic mean of all villages	12,7	16,0	3,4	0,7

It can be concluded that the amount carried home from traditional sources is quite small and increases only slightly with the provision of piped water.
The new supplies have at present a considerable over-capacity which successively will be reduced within 10 years.

2. Water quality

As yet no definite standards have been set in Tanzania for the water quality. WHO standards are still applied in Tanzania but it is felt that these are too rigid. One could distinguish between three different kinds of pollution of water supplies:

1) disease carrying organisms (mostly bacteria and viruses)

2) dissolved solids (salinity, fluorine, calcium, carbonate)

3) suspended solids (mud, colour, scum)

Dissolved and suspended solids at a water source can be measured by taking a sample to the nearest water analysis laboratory, and such tests are as a matter of routine done by the Ministry of Water Development.

The value of these tests is often greatly reduced due to the fact that the time interval between the proof-taking and the laboratory analysis is too long.
Testing facilities for the more important bacteriological pollutants have not been available. The WD & P has now started to carry out coliform bacteria tests with four mobile units.

Quality of water used

Since no regular checks previously have been made, the quality of different supplies varies considerably from one scheme to another and also over time.
Traditional sources are by and large heavily polluted through contact with human beings and animals, but such pollution is localized and limited to the people who use the source. If, on the other hand, the water at the intake of a piped water supply becomes polluted and no treatment is provided, the pollution rapidly spreads over the area covered by the scheme. For this reason all the larger schemes presently under contract are provided with a water treatment unit, which at the minimum chlorinates the water.

Apart from the possibility that the water at the tap is polluted, the handling of the water from there until it is finally consumed offers several occasions where it can be contaminated through human contact. A study of Ismani, Iringa Region, conducted by Kreysler (1969) showed that the water at the taps was relatively low in disease-carrying organisms, probably much lower than the traditional surface water sources. Samples from storage containers or household which take their water from the tap showed a greater variation of contamination with a general increase of disease-carrying organisms. The likely cause of this is the long storage time at the house during which time the water in the container reaches relatively high temperature, which stimulates the multiplying of bacteria. Kreysler also found that 10% of the patients attending the Ismani dispensary during September and October 1969 suffered from diarrhoea, dysentry, or diseases of the digestive system.

3. Time and energy in carrying water decreases

It is generally assumed that improved supplies reduce the distance which people have to travel to fetch water. More time can be spent either on productive activities or on leisure. The improved supply will provide water all the year round so that the distance travelled remains the same. Previously there was in many areas a significant difference between the distance travelled in wet and in dry season.

In order to supply water within acceptable distance, WD & P has adopted the following design criteria: "The number of domestic points and their distribution in relation to the density of population allows for a supply to 150-250 persons per domestic point or within a 1/4 mile (400 meters) from the furthest house if walking involved is on fairly level ground".

Empirical results

Warner and Heijnen adopted a method which merely recorded the time spent on fetching water. Evidence is so far contradictory. Warner's preliminary figures, and results from Nzega, using average for the whole year, indicate a significant decrease in travelling distance, while the first Ismani results show a decrease in the dry season, but an increase in the wet season.

In some cases, however, as in Mlola, it was discovered that people living less than five minutes from the tap, in a number of cases spent more time collecting water than before, owing to increased consumption. The distance travelled increased because more trips were made.

SOCIO-ECONOMIC BENEFITS

1. Health benefits

Poor water supply for the rural family is leading to bad health. Diseases result from low volume usage and from polluted water. Water diseases are also caused by insects living in the environment but dependent upon the water source.

The minimum requirements to achieve the objective are an increase in the volume of consumption and protection of water resources. These technical arrangements should, however, be supplemented by education and information that cattle and children must be prevented from walking in the water source, and bathing and washing of clothes naturally be banned. Garbage and excreta should be dumped far away from a water source. The public health benefits may not be realized unless the water supply program is accompanied by improvements of the environments as well as sanitation facilities and by changing patterns of behaviour.

a) Diseases removable by volume

An adequate volume of water should make it possible to reduce debiliating waterwashed diseases and improve standards of cleanliness and personal hygiene. Infections of skin or of the intestines, such as lice-born diseases, trachome, yaws, scabies, leprosy, skin sepsis and gastroenteritis, can be reduced by increasing availability of water. Qualitative evidence for their reduction is good, but the degree of reduction uncertain. Even diarrhoeic diseases such as shigella dysentery are affected by the quantity of water.

b) Diseases removable by purity

The classical water-borne diseases such as typhoid and cholera can be eliminated through a chlorination system. An epidemic is unlikely unless there is a considerable leak from the distribution system and the polluter is a disease carrier.

The water is normally not enough polluted to create dysentery, paratyphoid and infective hepatitis. When the infective does become high, however, some of the users of a water source might get the infection if the water is not purified.

Waterbased infections are locally of great importance. Guinea-worm can definitely be eradicated by simple water supply improvements.

c) Domestic supply arrangements

Infections with water-related vectors such as malaria and Gambian sleeping sickness may also depend on domestic supply arrangements. By cleaning the bush in the neighbourhood such vectors could be eliminated.

Empirical results

Studies to date have shown that, although there is some evidence of improved health, one must sincerely ask why there is not a more significant improvement. In Kreysler's study the recommendation for Ismani is to provide for treatment of the water supply and to give the water users health education.

The evidence from Bradley's extensive studies strongly suggests that a major improvement in health can only be achieved through the provision of individual household connections. The advisability of using closed storage containers in the house should also be explored and examined.

2. Improved conditions for livestock

It is assumed that provision of better water for livestock will improve the condition of existing animals and allow larger numbers to be kept. One of the criteria used by the Ministry of Water and Power to justify a project is thus the number of livestock which it will serve, two livestock units being equivalent to one human.

Empirical results

Cattle water consumption habits have hitherto not been adequately researched. During two tests at different times the livestock water consumption at one cattle trough in Kilimanjaro Region was one eight of the former standard of WD & P of 5 gallons per day for cattle and 1 gallon per day for sheep and goats. In Arusha Region the cattle population showed a rapid increase following the completion of a reservoir, accompanied by more overgrazing and soil erosion. During a severe drought the reservoir dried up and many animals died or had to be sold. A study in progress in Dodoma seems to confirm this trend.

3. Productive and social activities

It is not so easy to judge whether the additional time available is put into productive use or not. Warner attempted to evaluate this impact by taking down statements of the respondents. The question is, however, how much reliance can be placed on this. The results for a) domestic work, and b) shamba work, could easily be biased in view of the prevalent positive attitudes of respondents in interview situations. It is perhaps too simplistic to contend that the time spent on certain activities is, and on certain others is not productive.

Since primarily women and children are carrying water, any time released from this tiresome work, is more likely to produce social benefits instead of direct economic benefits. This could lead to a tremendous change in life pattern for the rural woman. More time could be spent on education if the new water supplies are supplemented with educational facilities. The energy saved will make it easier to maintain the often precarious balance between health and disease and threatening undernourishment. Furthermore, less time will be lost by visiting dispensaries during illness.

4. Stimulus for the development of secondary economic activities

One of the supposed benefits of a new water supply is that it encourages the growth of water using industries and commerce and the acquisition of new skills.

Empirical results

a) In Nzega the introduction of water has been accompanied by a marked increase in both water-using industries, notably brick-making, and commercial activity. As the whole area is already experiencing rapid economic development, it is impossible to say how much of this is directly attributable to water, but it appears that at least some part of it is, since those villages that have water points are growing more rapidly than others.

b) In Mayo village the provision of water, combined with a campaign to build better houses, encouraged an increase in brick-making, while the pipe installation provided training in the fitting and maintenance of water pipes.

CONCLUSIONS

Tanzania has decided to provide the whole rural population with improved water supplies within 20 years. This can be seen as part of an overall socialist strategy to bring equal social service and economic opportunities to all people in the country.

According to the plan it was intended to allocate funds to reduce former inequalities between the regions. A system for distribution of funds for the 20 years period was adopted in 1969. This system has not been followed during the last three years. Funds are still allocated to the regions according to their production capacity. The concentration of the funds in the regions with special ujamaa programs in Dodoma and Kigoma might even be interpreted as a more selective approach.

The direct impact of the water program is difficult to assess. Unless water investments are supplemented with other important inputs the assumed benefits are not likely to accrue. In relation to the socio-economic objectives set in the five year plan the following conclusions can be drawn:

Health benefits will not be achieved unless large quantities of wholesome and clean water is consumed. This will not be done unless information and health education for the correct handling and storage of the water is given as well as treatment and regular checks on the quality of the water. There are strong indications however that the volume consumed from communal standpipes is not enough to create the positive health effects.

It is not easy to judge whether the additional time available is put into productive or social activities. If education was available and planned together with water investments the spare time could be used both for adult and health education.

Self-help efforts have been used to a very limited extent. The need for a close cooperation between the water ministry and the local and regional authorities to carry out self-help schemes in order to mobilize local resources is therefore most urgent.

In order to obtain health conditions, better use of the spare time and the creation of more self reliance, the responsibility for the whole program must not be taken by the ministry alone, but in cooperation with local and regional planning authorities, as well as the people themselves in the rural areas.

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