

PN-ABI-975

Evaluation of US A.I.D. Technical Assistance for Water...  
GH.

628.13 USAID/Ghana.

M191 Evaluation of US A.I.D. Technical  
Assistance for Water Storage Facil-  
ities: 1957-1964. Charles K. Magee.  
Oct. 1964.

7 p.

1. Water storage- GH. 2. Evaluation- Water  
storage- GH. I. Magee, Charles K. II.  
Title.

GH  
628.13  
M191

-1'

68  
PN-ABI-975  
73109

US A.I.D. Mission to Ghana  
FOOD AND AGRICULTURE DIVISION  
-----

EVALUATION OF US A.I.D. TECHNICAL ASSISTANCE FOR  
WATER STORAGE FACILITIES: 1957-1964

by  
Charles K. Magee  
US A.I.D. Soils Advisor

October 1, 1964  
-----

I. PURPOSE AND SCOPE

This report contains a statistical listing and evaluation of the US AID technical assistance program for water storage facilities completed during the period 1957 - 1964.

This work has been confined primarily to the savannah areas of the Upper and Volta Regions of Ghana. There is a high concentration of population in certain areas. These areas suffer from soil erosion, seasonal water shortages, low crop yields and poor nutrition.

The main purpose of the Land Use and Water Development Project assisted by AID was to supply water in these areas where the rainfall distribution was such that available water limited the economy for some six or seven months each year.

This is being accomplished by construction of ponds and reservoirs to store excess water from the wet season for later use. There also is concurrent training of a Ghanaian cadre to, in turn, train other Ghanaians to continue this work. With ample water supplies, irrigated gardening has become common, improved vegetables and cultural practices introduced, and livestock husbandry has become practicable.

II. DESCRIPTION AND ACCOMPLISHMENTS

The first water storage facilities under the US AID Land Use and Water Development Project were completed in 1958. Since that time, 192 dams and dugouts have been constructed in Upper and Volta Regions, which have required nearly 2.8 million cubic yards of earth to be moved. The combined surface areas of all these dams

A.I.D.  
Reference Center  
Room 1658 NS

would make a lake that would cover some 2,257 acres. These water storage facilities have a combined storage capacity of 14,744 acre feet. In other words, there would be sufficient water to cover 14,744 acres to a depth of one foot.

These 192 dams have many uses. All are used for watering livestock, except three which were built for wildlife purposes. Livestock consists mostly of cattle, sheep, goats, and donkeys; however, horses, swine, and poultry make considerable use of the water in some areas. A total of 158 dams are known to be stocked with fish and the local people are fishing these waters. A total of 160 dams are known to provide people with water for normal household use, such as cooking, washing, drinking and bathing. There are 1,948 acres that may be brought under irrigation below these dams. The acreage shown here is suitable for irrigation, and there is adequate water to satisfy the irrigation needs.

In addition to the principal uses for the impounded water, the local people make use of the water for retting of hard fiber, distillation of spirits, construction of concrete and many kinds of building blocks, and recreation.

### III. U.S. CONTRIBUTION

US AID/Ghana has contributed more than 22 man-years of technical assistance to this project. The technicians have been specialists in soil conservation management, heavy equipment, livestock and water resources. This technical assistance has been provided at a cost of \$670,000 from the start of the project through June, 1964.

Training of Ghanaians in the U.S. has received much emphasis under this project. At the present time, 26 of 28 participants have returned from training in the United States. Returned participants have received 413 man-months of training in the United States at an AID cost of \$208,000 as of June 30, 1964. All returned participants are now employed by the Government of Ghana, and most are serving in assignments utilizing this training.

Because the Government's equipment use, repair, and maintenance techniques were found to be inadequate for the needs of the project, it was necessary to supply a heavy equipment specialist and to equip him with a basic workshop of US tools with which to do the training needed to keep the equipment operating. For this purpose, a mobile workshop was provided by AID with electric generating, welding, and automotive tools. Also, two dump trucks, one flat-

bed trailer, and a grader were supplied to demonstrate value and utility of U.S. equipment. All these together with incidental surveying instruments cost a total of \$46,000.

Contract services and other expenses on the project amounted to \$87,000, bringing the total U.S. expenditures to \$1,011,000.

#### IV. GHANA CONTRIBUTION

The Ghana Government has invested nearly \$2.0 million in heavy earth-moving equipment, supplies, furnishing, transportation and housing. This included housing and basic furniture for US AID Advisors. Each year thereafter, the Government met recurrent expenses averaging \$560,000. In the main, the annual appropriation has been ample from year to year to implement the project. It covered salaries for some 500 government workers of all grades and enabled the government to provide Ghanaian counterparts to be trained and chauffeurs to drive all GOG vehicles assigned to US technicians.

Ghana will have spent an estimated \$5.0 million on this project at the time of this report.

#### V. PROGRAM BENEFITS

The storage of water under this project to provide adequate supplies throughout the year is changing the pattern of living in the savannah areas of Ghana. The vast livestock potential of the area is now developing as shown by the large numbers being serviced by these reservoirs. Previously, livestock numbers were limited by the capacity of natural watering places during the dry season. Livestock will only graze so far from water, therefore the location of these natural watering places also limit available pasture. Crop production was limited to what could be produced during the rainy season only. In addition to the limitations placed on the numbers of livestock and crop production by the lack of water or rainfall distribution, much human labor had to be used in headloading water for normal household use. In some cases, during the dry season, water must be carried as far as five miles for this use. Reducing this distance by 50 percent or more in many cases has released a considerable amount of labor for other purposes.

What is a bucket of water worth. The longer one studies the problem of providing adequate water supplies, the more difficult it becomes to place a monetary value upon a unit of water.

US AID has guided the storage of nearly 15,000 acre-feet of water in Ghana. The number of livestock dependent upon this water, according to local Animal Health office figures, amounts to: cattle 56,297; sheep 31,128; goats 30,527; donkeys 2,184; and unknown numbers of horses, swine, and poultry. The value of this livestock would vary quite greatly because of quality and location. Applying a value of £G35 per head for cattle and £G10 for donkeys, would give a total value of £G1,992,235. Valuing sheep and goats at £G2 per head would make another £G123,310. This would place the value of livestock using these water facilities at £G2,115,545. Of course, there was livestock in these areas before the dams were built, watering from natural sources. However, a random sampling of livestock census before construction and at present reveals increases of 50 to 75 percent in some instances. A complete study of livestock numbers before and after dam construction was not possible in connection with this report as records did not exist or were not available in many cases.

These impounded waters have the capability of producing many tons of fish for human consumption each year. These fish are a welcome addition to the normal protein deficient diet, but the monetary value of this item would be difficult to assess.

Nearly 22 percent of the irrigation potential of these reservoirs is now in use. There are 419 acres being used for this purpose out of the 1948 that are suitable. Some of the areas have irrigation schemes using gravity, pumps, unlined ditches and lined ditches to provide water for contour furrow, flooding and sprinkler types of irrigation. Vegetable crops receive most of the irrigation, with tomatoes being the main vegetable crop. Lettuce, cabbage, onions, garden egg, pepper and several other vegetables are also grown under irrigation. Some irrigation is done by headloading with a watering can from reservoirs to adjacent garden sites. In addition to the irrigated vegetables, a regular crop is also taken during the wet season. This may be groundnuts, millet, guinea corn, rice or maize. The dry season irrigated gardens in connection with the regular crop provides year-round employment for those involved. These areas are operated by private farmers, cooperatives and state farms.

According to the best information available these irrigated gardens are producing about £G150 of vegetables per season per acre. The present annual value of these irrigated crops would be £G62,850. If all the irrigation potential at these dams were being properly used, the crops would have an estimated value of £G292,200.

The value of this water for human consumption is immeasurable--cooking, drinking, washing, bathing, and construction. It can be estimated roughly that the value of all crops and livestock being serviced or made possible by this project would be in excess of £G2 million. The total cost of construction is £G368,571. This cost represents only actual construction costs and does not include salaries of Ghanaian soil conservation officers and many other administrative and overhead costs.

For example, total net income to farmers in the Bongo Irrigation Cooperative amounts to more each year than the original cost of the dam to the Government of Ghana. This is an excellent return on investment in any language.

#### VI. CURRENT PROGRAM OF GOVERNMENT OF GHANA

The Ghanaian Government is continuing with the program in much the same manner in which it was started. The Irrigation and Reclamation Division of the Ministry of Agriculture has the responsibility for carrying out this program of work.

The areas of Ghana suitable for works of improvement under the Irrigation and Reclamation Division have been divided into 10 administrative zones. All of these zone offices are not staffed at present and there are zones that do not have land planning areas organized at this time. The administrative organization and staff is believed in excess of the needs. The production end of the organization is short of technical staff, machinery, and equipment.

Emphasis has been placed upon the development of irrigation schemes during the past year. This is a desirable trend in view of the fact that some 1,529 acres of good land has the necessary water at hand to provide irrigation. This awaits a system to be designed and built. The construction of dams with much larger storage capacities and multipurpose in nature is present Division policy.

The Ghana Government is still interested in sending participant trainees to study soil and water conservation in the United States. They are also hiring technicians, such as irrigation engineers from India, in order to more quickly complete a trained staff. The Irrigation and Reclamation Division has made good use of their returned participants. The improved quantity and quality of dam construction in some areas can be attributed directly to the management given by returned participant trainees.

The Irrigation and Reclamation Division have plans which include the purchase of much new heavy earth-moving equipment. Specialized machines for use in irrigation and farm machinery to be used in assisting local farmers and organizations get started with irrigation farming.

The current program of the Government, through the Irrigation and Reclamation Division, Ministry of Agriculture, is to continue to render greater services in the field of soil and water conservation and associated works.

#### V. RECOMMENDATION FOR FUTURE UTILIZATION AND EXPANSION

The Irrigation and Reclamation Division is doing a very commendable job of applying soil and water conservation works of improvement. The following comments and recommendations are submitted for improvement of the service:

1. More detailed survey and design work prior to construction

A more complete survey should be made on all proposed dam sites. The acreage of the watershed, average percent of slope, plant cover and soils information should be obtained and recorded. A topographic survey should be made of the reservoir and fill site area. This information is all necessary before proper designs can be drawn. Aerial photo coverage of all land planning areas should be provided at least on a zone basis to facilitate this work.

2. Establish engineering standards and procedures

The Irrigation and Reclamation Division should establish, publish and follow survey and design criteria for use by all personnel. This would improve the quality of work and eliminate undesirable design and procedure variance.

3. More and closer office supervision of all field work

The agriculture assistants at present are doing most of the field work supervision. Officer personnel should make a point of visiting field survey and construction work each day. They need to do this in order to have first hand knowledge of these operations, which would no doubt improve the quality and quantity of the work.

4. Keep accurate and complete records of all construction projects

This would include all survey and design information, construction costs and other pertinent data. This information will be useful in evaluating practice performance and making future recommendations.

5. Perform maintenance

All soil and water conservation works must have maintenance. The present trend is to continue with new construction while older dams are suffering for repairs. Some of these dams will be lost in the next year or two unless proper spillway repairs and other maintenance work is done.

6. Dam inspections

Inspect all dams at least once per year. In some cases it would be well to inspect following an unusually heavy rainfall. Schedule necessary maintenance in the annual plan of work, then follow the plan.

7. Design and build what is needed for a specific job

Design and build a water storage facility that is adequate to serve the purpose intended. Do not over-build, just for the sake of constructing a larger dam.

8. Priority of support to technical and field production personnel

Organization accomplishments at the end of the year are measured in acre-feet of storage and acres of land brought under irrigation. Therefore, the personnel involved in survey, design and construction, must have transport, fuel and equipment. They must have priority of support over administrative personnel at all times.

The Irrigation and Reclamation Division should be encouraged to continue with construction of reservoirs and irrigation schemes. The service should be expanded in such a manner as to be able to adequately assist all 10 zones with recommended soil and water conservation works of improvement.

Attachments:

- (1) Statistical listing of facilities by Land District
- (2) Statistical Summary and Project Totals
- (3) Location Maps