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NORTH CAMEROON

LIVESTOCK AND AGRICULTURAL DEVELOPMENT

PROJECT 631-0004

END OF TOUR REPORT

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This report is divided into four sections with each section discussing the soil and water conservation aspects of the Project:

1. Situation on arrival
2. Analysis of Project attempt to change situation
3. Recommendations for continued operations with no external assistance.
4. Conclusion

Other engineering activities such as the inspection of construction at the Project Center were not part of the mainstream activities of the Project and are not discussed in this report.

1. Situation on arrival

At the beginning of the two-year tour in January 1983 the Project had yet to begin any soil or water conservation activities. The grazing blocks had large, flat, bare areas that could neither stop the runoff nor hold the remaining topsoil. There were confusing systems of gullies that were obviously becoming larger and more dendritically organized with each rainy season. Even the cattle trails channeled the runoff until the running, cutting water had a chance to dig in and really take effect.

It seemed that very little of the 800 millimeters or so of annual rainfall was staying here. Much of it was evidently running off into the seasonal streams (mayos) and then going on its merry wasy to Nigeria, blithely taking parts of Cameroun with it.

2. Analysis of Project attempts to change situation

2A. Soil Conservation

The Project's soil conservation goal--according to the Projcet Reorganization Paper--was to "reverse the current degradation of the land resource base." The goal was to be achieved through the expansion of demonstrations of "re-establishing natural ground cover, artificial reseeding, establishing natural water barriers for gully control, dikes, diversions and subsoil penetration...(with) emphasis placed on techniques consistent with existing levels of technology in the zone."

It soon became apparent that such a noble goal was not likely to be attained. Much of the work would have required sophisticated equipment and a substantial investment in time just to measure the amount of soil being lost before any interventions took place, so that the measurement could be compared later with the amount of soil being lost after the demonstrations were complete. One would then hope that the second measurement would be less than the first. However, no work was done on this before 1983, therefore it was unrealistic to expect a measurable reversal in soil erosion to take

place in two years.

But the Project did successfully demonstrate that contour ripping, reseeding and scoop holes encourage grass, brush, etc. to grow and cover the affected areas, thereby reducing runoff and erosion. The problem is that the demonstrations require heavy equipment to do all but the smallest areas.

Finally, the Project planted 25,000 trees, but they are of questionable value for soil conservation purposes.

2B. Water Conservation

According to the same Project Reorganization Paper the Project was to construct at least nine water points "in conformity with the estimated stocking rate capacity of pilot grazing blocks...to facilitate livestock access within the limit of the normal five kilometer range of cattle. Water points will be placed in locations which will ensure efficient utilization of available forage under a rational system of grazing." The only types of rational water systems that come close to meeting such specifications are wells and artificial reservoirs. The reservoirs were chosen and the appropriate heavy equipment ordered; it arrived in Cameroun in late 1982. (The appropriate equipment was ordered, but--due to budget restrictions--smaller and lighter equipment was actually bought.)

Now, after two years, two artificial reservoirs have been constructed with a third one nearly complete. In general, the major advantage of the ponds is that there is more

flexibility in siting them than there is for a dam or well.

Some of the disadvantages are:

1. They are very expensive to build. In order to store one cubic meter of water for consumption about two cubic meters of earth must be moved.

2. They will be expensive to maintain. Bank erosion is evident on all three ponds. The soil that is eroded has no place to go but down into the pond. Also, if the sedimentation tanks are not cleaned out every year the required maintenance will be needed even sooner. Such work will be at least as expensive as the original construction.

3. They can spread disease. The ponds are being fenced in in order to prevent livestock and people from contaminating the water, but the fences will not last.

4. They require mechanical means to lift water from depths of up to eight meters. It remains to be seen how much labor and maintenance will be required, but both will be called for no matter what system is used.

As more of the ponds are built there may be ways found to overcome some of the disadvantages, but the prospect is not bright. (The design of the third pond is very close to the standard pond design used in Kenya, which has a great deal of experience in livestock water supply.)

It may be that the ponds should not be built. They are designed to provide a permanent source of water and will undoubtedly encourage overgrazing. It may also be that "techniques consistent with existing levels of technology" should be used here.

3. <u>Recommendations for continued operations with no external assistance</u>

A major consideration for further conservation work is the remaining life of the heavy equipment. If the two bulldozers each have 2,500 hours of use by the end of 1984 and if each life is 7,000 hours, then 9,000 hours of work is left for the two machines. (It is unlikely they will be replaced.)

The Project will probably do no more soil conservation work with the heavy equipment other than to try to construct the remaining firebreaks so that they will not contribute to erosion. (Dr. Ron Gaddis, soil and water conservation engineer, visited the grazing blocks at the Project's request and reported that the erosion created by the Project's roads and firebreaks was more serious than other erosion observed in the area.)

Therefore, assuming that most (8000 hours) of the remaining life is used to construct ponds, the equipment will be able to provide for another 3,000 stock units.

However, what if "techniques consistent with existing levels of technology" are used to water the livestock? At present, the local population waters their cattle in the mayos. They dig shallow wells and draw clean, filtered water that lasts the entire dry season. This is a simple system that was developed and organized locally to meet a local need. No wonder it works.

But can it be duplicated? The Project area is drained by several mayos, some of which are reported to yield water during the entire dry season. What if small dams of gabions with a clay core and masonry weir were built across the mayos? Sand would be trapped behind the wall, holding additional water for the dry season. A series of them would act as drop structures reducing the storm runoff velocity and thereby reducing bank erosion.

The advantages of this system would be:

1. They would be relatively inexpensive to build. The ponds store about one-half cubic meters of water for consumption for every cubic meter of earth moved, whereas the small dams could store ten cubic meters of water for consumption for every cubic meter of earth moved. That's an increase of 20 times the amount of water--for consumption--for the same amount

of heavy equipment work; or enough water for 60,000 stock units instead of 3,000 for the remaining life of the bulldozers. (Extensive work of this kind would require other equipment and personnel--front end loader, dump truck, water tanker, compactor, survey team, etc.--but it could definitely be tried on a small scale.)

2. There would be little or no maintenance. The silt and clay would not have enough time to settle behind the dam until the end of the storm; it would be on top to be picked up and carried away by the first runoff of the next storm. Also, there would be no pumps to break down; the people have their own methods of getting water from the mayos.

3. They would not spread disease. Any contamination from the animals would not penetrate the sand to reach the water; it would be carried downstream with the next storm. The livestock do not enter the cattle troughs. The water remains clean.

4. Bank erosion would decline. A series of small dams would change the profile of the stream bed from a straight line to a series of steps, which would force the runoff to slow down to a relatively non-erodable velocity.

4. Conclusion

Soil erosion is still a big problem in the Project area. Unfortunately, due to the recently constructed roads and firebreaks, the problem may be more serious now than it was two years ago. Massive inputs of heavy equipment time could reverse the trend, but it's not practical. Grass does grow and retard the erosion, but it is used as forage and is mostly gone when the heavy rains return to carry away the little remaining topsoil. Unfortunately, the artificial reservoirs encourage overgrazing, resulting in even more erosion.

It may be that the only way to improve ground cover and reduce erosion is to limit grazing by limiting the supply of water.