

SIXTH MONTHLY PROGRESS REPORT
Project No. 048-Sahel Desert
for the period
March 1 through March 31, 1979

Contract No. AID/DSAN-C-0048

Prepared by
Ebon Research Systems
Washington, D.C.

Prepared for
Agency for International Development
Washington, D.C.

Date of Preparation:
2 April, 1979

A. Progress During Last Thirty-One Days:

Stereo compilation of the interpreted land use photos was continued and is now approximately 50% completed.

B. Problems Encountered During Last Thirty-One Days:

- 1) It was originally planned to rectify the aerial photos before proceeding with the map compilation, since rectification would remove all displacement due to tip and tilt. However, because of the large amount of local relief in the southern part of the Grand Canyon Sheet (3000 feet in some areas), the displacement due to relief produced large placement errors. For this reason, it was decided that the compilation would be carried out by means of a stereo plotter, which would remove both classes of error-displacement and tip and tilt. This will result in the production of a far better product.
- 2) In cross-checking the interpretations, two problem areas were encountered: 1) in the eastern portion of the map sheet, areas of "Mixed Forest" (Category 43) cannot reliably be differentiated from "Evergreen Forest" (Category 42); and 2) in the western third of the mapsheet, the boundary between "Shrub-Brushland Rangeland" (Category 32) and "Evergreen Forest" (Category 42) is indistinct. The latter two categories are indistinguishable even on low level, 35 mm camera photos.

C. Progress Anticipated During Next Thirty Days:

- 1) Compilation of land use data will be completed.
- 2) Areas requiring field verification will be discussed with the Project Officer, Ivan Hardin, and plans will be made to obtain the necessary field data.

D. Problems Anticipated During Next Thirty Days:

None.

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A. Progress During Last Thirty-One Days:

- 1) Lithologic mapping was completed over the last four Test Sites and displayed on mylar overlays to the Landsat imagery. As discussed in the previous monthly report (Fifth Monthly Progress Report), the lithologic data were taken from existing geologic maps, where available, and adjusted to conform with the terrain features as displayed on the imagery. In many cases, the lithology depicted on the existing geologic maps did not appear to be of a high level of accuracy. Generally speaking, the lithologic boundaries are characterized by smoothly sweeping curves, indicative of interpolation between a scanty number of field observations. Rarely did contacts have the authentic, detailed appearance of beds that had been "walked out." In such cases the contacts were adjusted on the overlays to correspond with imaged indicators of lithologic change, such as drainage pattern, vegetation, and geomorphology. All such adjustments have been shown as dashed lines so that they can be readily distinguished from the contacts as shown on the existing maps.

In the portions of the test sites that are not covered by existing maps, contacts have been postulated by the project geologists, who first "trained" on the known geology.

- 2) Systematic examination of the Landsat imagery for indicators of desertification was begun and carried to approximately 50% completion. Thus far, the following indicators have been observed and mapped:
 - a. settlements, with attendant patterns of grazing and over-grazing;
 - b. dust storm deposition;
 - c. active dunes;
 - d. burned areas;
 - e. areas of de-vegetation; and
 - f. stabilized dunes.

An interesting sequence was observed when mapping settlements in Inland Delta Site. Settlements are mapped on the basis of two co-existing clues: a dark undifferentiated dot (the settlement itself) surrounded by a light-toned pattern caused by grazing. On a 1973 scene, many settlements (on the order of 150) were detected. On a 1975 scene, in which considerable de-vegetation is apparent, very few settlements (about 50) could be found. Finally on a 1976 scene, in which some re-vegetation has taken place, the number of settlements was found to be approximately as great as in the 1973 scene. It is not yet clear, however, whether this apparent abandonment and resettlement is an actual phenomenon or simply the result of the difficulty of detecting grazing patterns in an area being de-vegetated by drought.

Burned areas are confidently or sequentially imaged and are important in that burning destroys dormant and detrital biomass, thereby de-stabilizing the soil and creating a pre-condition of desertification.

Large areas of recent desertification, tens of square miles in size, have been observed at the Inland Delta Site. These areas were first noticed on a 1975 scene, and most of them persist on a frame taken in 1976, although some re-vegetation can be seen. Most of the de-vegetation occurs on stabilized dunes, which tends to imply that areas underlain by such dunes are more susceptible to desertification than other areas. This is a reasonable assumption, since it is known that soil development is notoriously poor on recent stabilized dunes. Dune morphology is readily detected on the imagery, however, which means that in any desertification monitoring program, these susceptible areas could be delineated and given special attention as "early warning indicators."

3. Weather satellite imagery of the kind available over the Sahel (TIOS Scanning Radiometer) was examined and found to be unsuitable for monitoring desertification. The scale of this imagery is 1:100 million, and the resolution is ± 4 km. Another sensor, the Very High Resolution Radiometer, (VHRR) has a resolution of ± 0.9 km and may be very useful. Since none is available over the Sahel, an example taken over the Mojave Desert has been ordered.

B. Problems Encountered During Last Thirty-One Days:

None

C. Progress Anticipated During Next Thirty Days:

- 1) Completion of selection of groundwater drilling sites based on structure and lithology
- 2) Completion of mapping of indicators of desertification
- 3) Initiation of computer analysis of Landsat scenes for detecting presence of living, dormant, and detrital vegetation

D. Problems Anticipated During Next Thirty Days:

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B. Problems Encountered During Last Thirty-One Days:

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