BANGLADESH LANDSAT-2 PROGRAMME

I. INTRODUCTION:

Title of Investigation	Investigations using data from Landsat-2.
Investigation Number	# G 27950
Principal Investigator	Dr. Anwar Hossain
Name and address of Principal Investigator's Organization	Member, Bangladesh Atomic Energy Commission, P.O. Box 158, Dacca, Bangladesh.
Date	August 1976
Type of report and period covered	Quaterly Report April-June, 1976.
Name and address of National Sponsoring Agency	Bangladesh National ERTS Committee, Science & Technology Division, Ministry of Education, Government of the People's Republic of Bangladesh, Dacca, Bangladesh.

II. TECHNIQUES:

Landsat Imageries were reproduced using conventional Photographic Techniques. The products used for analysis consist mainly of black and white Prints of 9½ inch size. Small test areas were blown up to a maximum enlargement of 10 times.

The interpretation was done mainly by visual observations in all MSS bands. In some cases stereoscope, light tables etc., were used. Aerial photographs and Ground-truth data available were used for analysis in conjunction with the Landsat imageries.

Ground-truth observations were made during this period on the following dates and Test Sites: (1) April 11, 1976. Savar, Demra Test Sites near Dacca. (2) April 19-25, 1976. Low lying depressed area (locally called HAOR area) in the Sylhet District. Field photography was carried out coinciding the dates of satellite passes

over the test sites using Yashica MATT and Rolleiflex Cameras. Aerial Survey of the Haor Area in the Sylhet district was also made in February 1976. Ground truth data in the field of Agriculture, Geology, Hydrology, Forestry, Fisheries, Cartography, Meteorology etc. were also collected by the individual sectors through their respective departmental sources at various Test sites in Bangladesh.

ACCOMPLISHMENTS:

Bangladesh Landsat Centre has been established and its furnishing is in progress. UNDP assistance amounting to $ 469,150 has been approved by UNDP, New York with Food & Agriculture Organization (FAO) of UN as the Executing Agency of the Project. Appointment of Remote Sensing Adviser, procurement of necessary equipment/materials and training of investigators are in the process.

Meanwhile the Principal Investigator & Chief Investigator (Instrumentation) have been trained in a short course on 'Remote Sensing Technology and Applications' in LARS at the Purdue University, West Lafayette, Indiana, U.S.A. (June 21-25, 1976) under USAID Technical Assistance. The Chief Investigator (Instrumentation) participated in a Symposium on "Machine Processing of Remotely Sensed Data" held at Purdue University (June 29 - July 1, 1976). They also visited EROS Data Centre, Sioux Falls, USGS, GSFC, NASA Hq. Air and Space Museum and held technical discussions with various personnel in U.S.A.

Landsat imageries have been used for studying new land accretion in the Bay of Bengal. There are positive indication of new land in the south of Patuakhali and Hatiya Island. There are also indications of erosion in the north of Hatiya Island.

A systematic study is underway. Scheme for stabilization and consolidation of these new lands by afforestation & other methods are under processing. Necessary Govt. orders are being issued setting aside land for afforestation in these new accreted lands on the basis of Landsat mosaics.

Preliminary Land use maps of Sunamgonj, Baniachong and Srimongal areas in the district of Sylhet have been prepared using Landsat imageries, Aerial Photographs and Ground-truth observations.

Dr. Wagner and Mr. W.L. Smith of the Environmental Research Institute of Michigan (ERIM) USA visited ERTS Centre on 18.2.76. They held discussion with the ERTS Task Force Members and reviewed the program of work of the joint Programme of ERIM-Jahangirnagar University for studying optimum utilization of Sylhet-Mymensingh Haor area of Bangladesh. They also made an aerial survey of the Haor area on 18.2.76 by a plane of the Plant Protection Department.

Bangladesh Landsat Task Force, IDRC of Canada and ERIM of USA are planning for a Co-operative programme on 'Applied Research and Training in Remote Sensing' with the following objectives:-

i) Study of Karnaphuli reservoir and its watershed in Chittagong Hill Tracts.

ii) Surface water study in the Lower Ganges basin for development of dry season water reserves for irrigation and land use.

iii) Study of the salinity intrusion in the South & West Bangladesh.

Mr. S.A. Hempenius and Mr. F.C. D'Audretsch of the Netherlands visited Bangladesh under the sponsorship of UN/ESCAP from March 23-25, 1976 in connection with a study Mission on Remote Sensing, Surveying, Mapping and Land Resource Evaluation and the possibility

of establishing a Regional Receiving Facility Centre for Resources Satellite (ERTS) Data. They held discussions with various Govt. officials.

Bangladesh Landsat Task Force participated in the Science exhibition held at the ERTS Centre, C/o SARC, Atomic Energy Commission from March 29 to April 2, 1976. This was organized in connection with the 1st annual Bangladesh Science Conference held at Dacca. ERTS exhibits were appreciated by the visitors.

Cartographic up-dating of mapping, winter crop estimation, inventory of Forest resources, Water drainage pattern, fish resources, flood forecasting & damage etc. using Landsat imageries are under progress.

IV. SIGNIFICANT RESULTS:

1. Preliminary land use maps of Sunamgonj, Baniachong and Srimongal areas in the Sylhet districts have been prepared.

2. Indication of new land in the South of Patuakhali district and Hatiya island have been found and erosion in the northern part of Hatiya island is also indicated.

3. Mosaic maps of the coastal area of Bangladesh in bands 4 and 7 have been prepared using Landsat imageries of 1972-73 and 1975. These were supplied to our Foreign Office/Bangladesh Inland Water and Transport Authority (BIWTA) for presentation to the 3rd UN conference on the Law of Sea held in New York in April 1976.

4. Landsat imageries have been supplied to the following organizations for studies:-

   a) Universities for research in water resources, river morphology and other geographic & geological features studies. Universities are also using Landsat imageries in

the graduate/Post Graduate courses/research.

b) Geological Survey for geological feature studies.

V. PUBLICATIONS:

The following papers/articles/reports have been published:

1. Remote Sensing in Agriculture - A. Azim. Presented in a Seminar in the Department of Plant Protection on June 19, 1976.
2. A Satellite for the Millions - A.M. Choudhury, July, 1976.
3. How much Land we can get from Sea - A.M. Choudhury, August, 1976.
4. Joint report on attendance of short course/symposium on Remote Sensing and technical visits/discussions in USA (June-July 1976) - Anwar Hossain & M.A.H.Pramanik, August 1976.

VI. PROBLEMS:

Due to delay in getting formal approval of the Revised Landsat Scheme by the Government of Bangladesh, the following requirements could not be met as scheduled :-

i) Necessary equipment/materials could not be procured and the training of the investigators could not be undertaken.

ii) Full-time officers/staff could not be recruited. As such part-time officers/staff are working in the project.

However, necessary steps are being taken for solving these problems.

VII. DATA QUALITY AND DELIVERY:

The quality of the data product is good. As far as the delivery of the Landsat-2 imageries is concerned, we did not receive any imageries from EROS Data Centre after December 1975 as per our

standing request. During my recent visit to EROS/GSFC, the problem has been sorted out.

VIII. RECOMMENDATIONS:

The contract agreement of Bangladesh with NASA for supplying Landsat-2 imageries expires on May 31, 1976. Request has been sent for its extension upto July 31, 1977. It is recommended that the extension may be granted.

NASA should ensure the continuity of Landsat satellites. A Landsat Data Receiving facility should be established in the region so that dynamic features can be studied.

IX. CONCLUSIONS:

Promising results have been obtained by analysing Landsat imageries by different sectors of Bangladesh Landsat Programme and Universities. Landsat imageries are very valuable for studying land features and resources survey. It is strongly felt that Landsat imageries will be a continuous source of information required for planning and development of Bangladesh.

JOINT REPORT

ON

Attendance of Short Course/Symposium on Remote Sensing and Technical visits/ Discussions in USA(June-July 1976).

by

Dr. Anwar Hossain
Member, Atomic Energy Commission
& Principal Investigator,ERTS Programme

and

M.A.H. Pramanik
Senior Scientific Officer
Atomic Energy Commission
& Chief Investigator(Instrumentation),
ERTS Programme.

August, 1976.

The tour programme of Dr. Anwar Hossain and Mr. Pramanik was almost identical except certain changes which are given in the seperate tour itenerary vide Annexure I and II.

1. SHORT COURSE (JUNE 21-25, 1976).

A two-member delegation (Dr. Anwar Hossain and Mr. M.A.H. Pramanik) from Bangladesh attended a short course on 'Remote Sensing Technology and Applications' held at the Laboratory for Applications of Remote Sensing (LARS), Purdue University, West Lafayette, Indiana, U.S.A. The course consists of lectures (both video tape & live), minicourses and discussions with the LARS staff on different aspects of Remote Sensing Technology and applications. The lectures were supplemented by hands on computer experience work in the evening as well as visits to the computer room. Certificates were distributed to the participants at the end of the course.

1.1. Lectures

LARS staff delivered lectures (both video tape & live) on the following topics:

(a) Introduction to and background of remote sensing.

(b) LARSYS software system.

(c) Landsat Data Analysis Simulation workshop series.

(d) Multispectral scanner system.

(e) Special characteristics of the Earth surface features.

(f) Pattern recognition applied to remote sensing.

(g) Remote sensing applications.

1.2. Mini-Courses

A series of minicourses on different aspects of the Remote Sensing were arranged. These consist of tape-recorded speech, slide-showing followed by a number of questions to be answered at the end of the course. These courses may be commercially available as a self-teaching material on remote sensing. Minicourses on the following topics are available:

(a) Remote sensing-what is it?

(b) The physical basis of remote sensing.

(c) Photographic Remote Sensing system.

(d) Interpretation of colour Infrared photos.

(e) Optical Mechanical Scanners.

(f) Interpretation of Multispectral Scanner data.

(g) Radar Systems.

(h) Satellite Systems-ERTS & Skylab.

(i) Mission Planning Considerations and Requirements.

(j) Spectral reflectance characteristics of vegetation.

(k) Spectral characteristics of the Earth's Surface features.

(l) Pattern Recognition for Remote Sensing.

(m) Applications of Remote Sensing to Forestry, Geology, Crop Surveys.

(n) Temperature mapping of water.

1.3. Computer Hands on Experience.

This programme included the following:-

(a) Demonstration of the capabilities and procedures for using the LARSYS software system.

(b) Hands on experience - to familarize with computer/ terminal procedures using a pre-arranged format and sample LARSYS programmes and

(c) Classification of a portion of a frame using one of the several pre-selected Landsat frames.

This programme was arranged in the evening under the guidance of an instructor.

1.4. Technical Visits and Discussions

A visit was arranged at the computer room showing the facilities and working procedures. Extensive discussions were held with different LARS staff members on various aspects of the Remote Sensing including Co-operative Programme with LARS. The names of the following key personnel may be mentioned:

(a) Dr. D.A. Landgrebe,
Director, LARS, Purdue University, West Lafayette.

(b) Dr. J.B. Peterson,
Associate Director, LARS, Purdue University, West Lafayette.

(c) Dr. J. Linderlaub,
Programme Leader, Technology Transfer, LARS,
Purdue University, West Lafayette.

(d) Dr. D.B. Morrison,
Training Co-ordinator, LARS, Purdue University,
West Lafayette.

(e) Dr. P.H. Swain,
Symposium Chairman, LARS,
Purdue University, West Lafayette.

2. SYMPOSIUM ON MACHINE PROCESSING OF REMOTELY SENSED DATA (JUNE 29-JULY 1, 1976).

Mr. Pramanik participated in the symposium. The central themes of the symposium were the theory, implementation and application of machine processing of remotely sensed data. There were two plenary sessions and four technical sessions divided into two concurrent meetings each. This symposium has provided an opportunity to learn the technological developments of data processing & utilization and some significant results obtained by various researchers. Papers were presented on the following topics:

(a) A multidimensional Look at Remote Sensing.

(b) Systems used in Remote Sensing.

(c) Natural Resources.

(d) Data Analysis and Processing.

(e) Transfer of Technology.

(f) Remote Sensing Applications in various fields particularly Agriculture & Forestry.

3. VISIT TO EROS DATA CENTRE, SIOUX FALLS, S.D.

(Dr. Anwar Hossain - June 28-July 1,1976
Mr. M.A.H. Pramanik - July 2, 1976).

Instead of participation in the symposium in Purdue University, Dr. Anwar Hossain went to EROS Data Centre, Sioux Falls, S.D. for training in the examination and image interpretation of Landsat imageries using some imageries of Bangladesh. First day's visit of Dr. Anwar Hossain to EROS Data Centre was jointly arranged with .. Mr. Paul Ahui, Director, Geological Survey, Ivory Coast and Mr. Serge Bluds of the US State Department.

Dr. Anwar Hossain, had a busy schedule at EROS Data Centre from June 28 to July 1, 1976 and the following activities were undertaken :-

3.1. Attendance of lectures delivered by:

(a) Mr. A.H. Watkins, Chief EROS Data Centre.

The lecture was an introductory and welcome speech giving the details of EROS Programme and Data Centre Overview.

(b) Dr. G.K. Moore on Hydrology.

3.2. Discussions with the following EROS Staff were held on various activities of EROS Data Centre.

(a) Mr. R.A. Pohl,
Chief Data Production.

(b) Mr. D. Ulmer,
Deputy Chief, Systems Development Branch.

(c) Mr. R.J. Thompson,
Computer Branch.

(d) Dr. R.G. Reeves,
Geologist (Tour Co-ordinator).

(e) Mr. D.T. Lauer,
Trainin- and Applications Assistance Activities.

(f) Mr. F.A. waltz,
Data Analysis Laboratory.

(g) Mr. G. Bartunek,
User Services.

(h) Mr. Dave Greenlee
Data Analysis (Image 100) Branch.

3.3. Training in the examination and image interpretation of some Landsat imageries of Bangladesh using the equipment facilities of EROS Data Centre particularly Image-100, IDIMS, Microfilm Reader etc. Analysis was made from an available CCT of Bangladesh .

3.4. Collected following information about EROS Data Centre

(a) It takes about 45 days from Data Acquisition by Landsat to the delivery of imageries to users within USA. For delivery outside USA, it takes more time.

(b) EROS Data Centre has about 6×10^6 frames out of which about 53% are of Landsat imageries.

(c) Total Landsat Frames available upto May 31, 1976 is of the order of 7,74000. Out of this about 39% of frames are for the countries outside USA. It may be mentioned that the Industrial concerns in USA are the main customers of Landsat imageries.

(d) Activities of the EROS Data Centre are centered around the following topics:

(i) Training.

(ii) Development of Training Aid.

(iii) Day-to-day application assistance.

(iv) Co-operative Demonstration Project.

(v) Data Analysis Support.

3.5. Mr. Pramanik made a short visit to EROS Data Centre on July 2, 1976. He was showed around the different laboratories/equipment and activities of EROS Data Centre. He carried out some follow-on activities left over by Dr. Anwar Hossain and held Technical discussion with various EROS staff.

3.6. Problems connected with the delivery of Landsat imageries were discussed and it was decided that the NASA account with Bangladesh Principal Investigator will be updated.

4. WASHINGTON D.C.

(Dr. Anwar Hossain : July 2-10, 1976
Mr. Pramanik : July 3-9, 1976).

4.1. Due to bicentennial celeberations in USA, offices were closed as such programmes could not be started before July 6, 1976.

4.2. Held discussion on 6.7.76 with Mr. J.E. CAMDEN of US AID Washington and finalised the tour programme in consultation the Bangladesh Embassy, Washington.

4.3. Visit to Geological Survey of USA, Reston, Virginia (July 7, 1976).

Held Technical discussions with the following:-

(a) Dr. S.J. Gawarecki,
Staff Geologist for Remote Sensing,
Office of International Geology, USGS.

(b) Mr. M.L. McKenzie,
Chief, Branch of Photogrammetry, USGS.

(c) Dr. R.M. Moxham,
Physics Lab, USGS.

(d) Dr. C.J. Robinove,
EROS Program, USGS.

(e) Mr. J.W. Schoonmaker Jr.
Photomosaic Section, USGS.

Technical discussions covered wide range of subjects including use of Landsat imageries for Geological and Hydrological Surveys, cartographic mapping, mosaic preparation, Nuclear Geophysics etc. Possibility of Training of some Bangladesh Trainee in the fields of Remote Sensing as well as Nuclear Geophysics were also discussed.

Discussions were followed by visits to different Laboratories/ Equipment etc.

4.4. Visit to Goddard Space Flight Centre (GFSC) Greenbelt, Maryland and NASA HQ. Washington DC (July 8, 1976).

(a) Dr. J.C. Broderick (Landsat-1 Technical Monitor, GSFC) received us and showed around various sections particularly Operation Control Centre, Data Processing Facilities Centre etc. Discussions were held with him about the Landsat-1 Data utilization and progress reports.

(b) Discussions were held with Mr. Edmund F. Szanja (Landsat-2 Technical Monitor, GSFC) on the following topics:

(i) Transfer of $ 2400 from CCF account (# GB 7950) to Landsat Account (# G 27950).

(ii) Progress Reports.

(iii) Landsat imageries of Bangladesh and standing request with EROS Data Centre.

(c) Discussions were held with Mr. J.V. Zimmerman and Miss L. Robock of NASA Hq (International Affairs) On the following topics:-

(i) Extension of NASA contract period beyond May 31, 1976.

(ii) Landsat activities in Bangladesh.

(iii) Future of Landsat Programme in NASA.

(iv) Landsat Budget for Bangladesh from NASA sources.

4.5. Visit to Air and Space Museum (July 8, 1976).

Visited Air and Space Museum and Washington DC and saw inumerable exhibits on various aspects of Space Science and Technology development and achievements.

4.6. Visit to the State Department (Bureau of Oceans and International Environmental and Scientific Affairs) (Dr. Anwar Hossain - July 9, 1976).

Dr. Anwar Hossain held discussions with the following personnel of OES:-

(a) Mr. M. B. Kratzer,
Deputy Assistant Secretary for Nuclear Energy and Energy Technology Affairs.

(b) Mr. D.N. Senkins,
Nuclear Energy & Energy Technology Affairs.

(c) Mr. D.B. Archard,
Country Officer for Bangladesh (NEA/PAB).

Discussions were centered around a possible agreement between USA and Bangladesh on the peaceful application of Atomic Energy. There are two types of agreement:-

(i) Research Reactor less than 5 Megawatt plus other equipment including food irradiator.
This type of agreement involves less formalities and can be signed in a short period.

(ii) Power Reactor, This involves complicated formalities. The Draft agreement is to be submitted to the President who will refer to the Congress for review and then to be examined by the Joint Committee on Nuclear Energy. It may be mentioned that review period has been increased to 60 days from 30 days since 1974.

The above discussions were fruitful and the follow-up actions will be taken up by the Bangladesh Embassy, Washington DC.

4.7. Visit to NOAA (National Oceanic and Atmospheric Administration), Suitland, Maryland (Mr. M.A.H. Pramanik, July 9, 1976).

(a) Held discussions with Mr. J.C. Glover, Special Assistant to the Deputy Director, NOAA on the following topics:-

(i) Future Programme of Weather Satellites.

(ii) Up-dating of receiving equipment at Ground Stations for Weather Satellites.

(b) Discussions were followed by visit to the Operation Control Centre and Data Receiving Centre of NOAA.

4.8. Visit to Bangladesh Embassy (July 9, 1976).

Held discussion with Mr. S.R. Karim, Economic Minister of Bangladesh Embassy regarding the tour programme as well as different activities in USA. He was requested to pursue the follow-up actions as and when required.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. The short course/symposium/visits/discussions were very much beneficial. The knowledge gathered will help us in planning and implementation of our country's remote sensing projects.

5.2. The up-dated information obtained during the tour programme can be effectively used for our projects.

5.3. UNDP may be requested to start the implementation of the Bangladesh ERTS Project immediately so that the credibility gap with NASA & other international organizations may not be widened.

5.4. NASA may be requested for continuation of Landsat Programme for Bangladesh so that we could use the data for our National Projects.

5.5. UN may be requested for establishing a Regional Receiving Centre for Landsat Data in Bangladesh.

5.6. Bangladesh Landsat Centre has been established. The formal approval of the revised scheme by the Government of Bangladesh may be given on priority basis.

5.7. Landsat activities in Bangladesh may be geared up so that we could keep pace with other international organizations particularly in Landsat data utilization.

5.8. It is felt that a post of a Scientific Attache may be created in Bangladesh Embassy, Washington.

6. ACKNOWLEDGEMENTS

The authors are grateful to the Government of Bangladesh and USAID, whose permission and financial Assistance respectively made the tour programme possible. They are also grateful to various organizations and individuals whose kind cooperation & help made the tour programme successfull. Special thanks to Mr. S.R. Karim, Economic Minister, Embassy of the Bangladesh, Washington for his assistance & cooperation.

Annexure-I

Tour Itenerary of Dr. Anwar Hossain, Member, Atomic Energy Commission and Principal Investigator, ERTS Programme.

Date	Schedule
17-6-76(Thursday)	Departure Dacca 2145 hrs by BA 749
18-6-76(Friday)	Arrival London 0730 hrs.
20-6-76(Sunday)	Departure London 1230 hrs. by TW 771 Arrival Chicago 1500 hrs. Departure Chicago 1620 hrs. by ZW 460 Arrival Lafayette,(USA) 1700 hrs.
21-6-76 to 25-6-76 (Monday to Friday)	Attendance of short course on "Remote Sensing Technology and Applications" and computer hands on work in the evening.
27-6-76(Sunday)	Departure Lafayette 1350 hrs. by ZW 441 Arrival Chicago 1430 hrs. Departure Chicago 1715 hrs. by OZ 983 Arrival Sioux Falls, SD 1915 hrs.
28-6-76 to 1-7-76 (Monday to Thursday)	- Visit to EROS Data Centre - Training in the examination and images interpretation using some Bangladesh Landsat imageries. - Discussion with Technical Personnel.
2-7-76(Friday)	Departure Sioux Falls, 0810 hrs. by OZ 982 Arrival Chicago 0945 Departure Chicago 1153 by UA 430 Arrival Washington 1440 hrs.
6-7-76(Tuesday)	Discussion with Mr. J.E. CAMDEN of US-AID Washington and Finalization of programme in consultation with Bangladesh Embassy, Washington.
7-7-76(Wednesday)	Visit to US Geological Survey, Reston, Virginia.
8-7-76(Thursday)	- Visit to Goddard Space Flight Center(G.S.F.C.) Greenbelt, Maryland. - Discussion with Mr. Zimmerman of NASA HQ. - Visit to Air & Space Museum.
9-7-76(Friday)	- Visit to the Bureau of Oceans and International Environmental and Scientific Affairs (OES) of the Department of State, USA. - Discussion with the personnel concerned with Nuclear Energy and Technology Affairs. - Visit to Bangladesh Embassy.
10-7-76(Saturday)	Departure Washington 2145 hrs. by PA 106
11-7-76(Sunday)	Arrival London 0940 hrs.
12-7-76 to 20-7-76	On leave in Zurich.
21-7-76(Wednesday)	Departure London 2200 hrs by BA 738
22-7-76(Thursday)	Arrival Dacca 1730 hrs.

Tour Itenerary of Mr. M.A.H.Pramanik, Senior Scientific Officer, BAEC and Chief Investigator (Instrumentation), ERIS Programme.

Schedule

Date	
17-6-76(Thursday)	Departure Dacca 2145 hrs by BA 749
18-6-76(Friday)	Arrival London 0730 hrs.
19-6-76(Saturday)	Departure London 1135 hrs by PA 055 Arrival Boston 1400 hrs. Departure Boston 1530 hrs by TW 435 Arrival Chicago 1700 hrs. Departure Chicago 1730 hrs by ZW 560 Arrival Lafayette (U.S.A.) 1810 hrs.
21-6-76 to 25-6-76 (Monday to Friday)	Attendance of short course on "Remote Sensing Technology and Applications" and computer hands on work in the evening.
28-6-76(Monday)	Visit to the Department of Geo-Sciences, Purdue University West Lafayette, Indiana, USA.
29-6-76 to 1-7-76 (Tuesday to Thursday)	Participation in the symposium on "Machine Processing of Remotely Sensed Data", held at Purdue University, West Lafayette, Indiana, USA.
1-7-76(Thursday)	Departure Lafayette 1430 hrs by Taxi (due to cancellation of Flight ZW 441) Arrival Chicago 1715 hrs. Departure Chicago 1730 hrs by OZ 983. Arrival Sioux Falls, South Dakota 2030 hrs.
2-7-76(Friday)	Visit to EROS Data Center, Sioux Falls, S.D.
3-7-76(Saturday)	Departure Sioux Falls 1235 hrs by OZ 934. Arrival Chicago 1430 hrs. Departure Chicago 1530 hrs by AA 638. Arrival Washington DC 1800 hrs.
6-7-76(Tuesday)	Discussion with Mr. J.E.CAMDEN of US-AID, Washington and Finalization of Programme in consultation with Bangladesh Embassy, Washington.
7-7-76(Wednesday)	Visit to US Geological Survey, Reston, Virginia.
8-7-76(Thursday)	Visit to Goddard Space Flight Center(G.S.F.C.) Greenbelt, Maryland. Discussion with Mr. Zimmermanof NASA H.Q. Visit to Air & Space Museum.
9-7-76(Firday)	Visit to NOAA H.Q.(National Oceanic and Atmospheric Administration) Suitland, Maryland. Visit to Bangladesh Embassy.
9-7-76(Friday 10-7-76(Saturday)	Departure Washington 2030 hrs by PA 106 Arrival London 0930 hrs.
11-7-76 to 20-7-76	On leave in London.
21-7-76(Wednesday)	Departure London 2200 hrs by BA 738.
22-7-76(Thursday)	Arrival Dacca 1730 hrs.