CAPABILITY OF REMOTE SENSING APPLICATION IN LAND USE,LAND RESOURCES WITH USING TM DATA,GIS FACILITIES, IN PART OF IRAN.

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ABSTRACT:

land information is important to a wide variety of human enterprises such as agriculture, ferestry, water resources as well as other type of land resources management.

Landsat Thematic Mapper (TM) data with high resolution, particularly the synoptic detailed view (repeated coverage) can be of considerable in the identification and extent of a variety of land use.

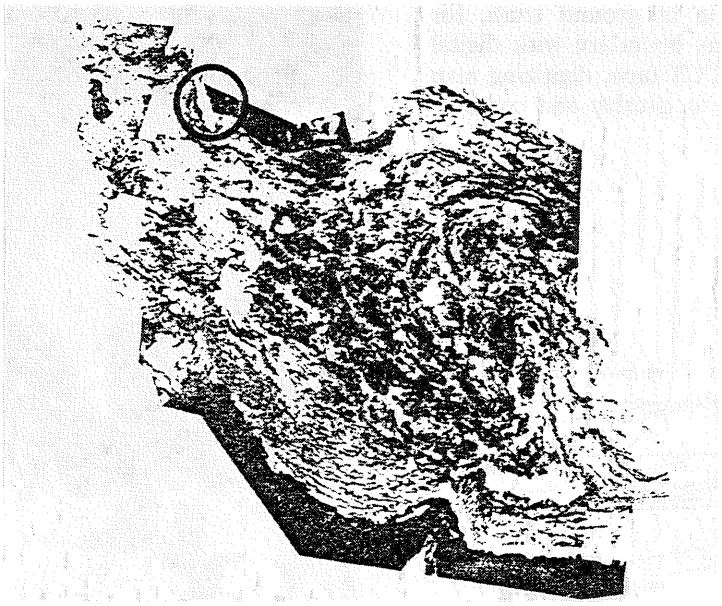
The production of various thematic maps together with an up - to - date base map is an excellent way to document land use potential.

This paper summarizes the results of a land use map, compiled in the department of agricultural statistics and information, ministry of agriculture of Iran. The main objective of this study is to investigate unique characteristics of land units by using color composite imageries of bands 2,3,4 in different dates as 1989, 1990, 1991, 1993 in different seasons by appling crop calender for every crop land, along with collection of ground truth data.

The study area covers an area around 68450 square km located in northern part of Iran.

In this study area 9 (nine) quadrant of landsat thematic mapper imageries (as shown in fig.1) were used to prepare the base map of the area, to discriminate the total of 7 main classes with detailed sub - classes and to provide, agricultural planner, with an evaluation of the agricultural potential of the region.

In the conjunction of this study also the GIS facilities, were applied ARC/INFO,EASI/PACE, and using Twinhead SS10 unix systems, to overlay and Finally total of 11 sheet land use maps with 1:100,000 scale. with the 30' by 30' geographic coordinated.



Location of area in photomap of Iran.

1. INTRODUCTION

The thematic mapper (TM) data from landsat satellite have been utilized in Iran for the last few years to recognize and assess, land resources in various ways, proving their efficient performances as a good tool, especially for landuse mapping and land deduction in general.

However the advent of the thematic mapper (TM) data with high resolution has made the mapping work facilitate better interpretation and analysis of the required object, as such, in this paper an attempt has been made to extract various information of crop land and land resources of Gilan region.

2. METHOD AND MATERIALS

To start with, the false color composit of the landsat TM data in bands 2, 3, 4 and 4, 5, 7 in the month of june july 1989, 1990, 1991 and 1993 at the average of 1 : 100,000 scale, were selected, the total image are 9 quadrants which cover the gilan province, an area about 68450 square km were chosen, for visual analysis as reflected through the image characteristics,during the month of july when the data were scanned, most of the cropsland were harvested, or in some part werenot devoid of crops, consequently, the radiant energy which produced the spectral signature mostly for the harvested surface, with communicated a good and usefull - idea to the interpreter that the various image characteristics recorded on the imagery were mainly due to the variation of crop land and soil color with the colors of exposed stones, and rocks, in forest region, and bare surface, the interpretative boundary become almost of crop land boundary in the region, all these interpretative units were correlated and compared with available data in hand, finely a landuse uints were extract, after collection of ground truth, for compared interpretative units boundary with digital analysis units and available CCT tape, digitizing map also apply the GIS method, to overlay and combine together.

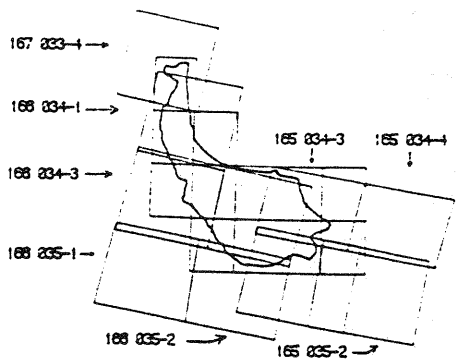


Fig.1 Location of study area in index of TM

3. VISUAL INTERPRETATION

The interpretation of the TM data was carried out in the Remote sensing Laboratory of ASID on the basis of various image characteristics to occur in the area

MATERIAL

This porject was performed using map, satellite landsat (TM) data.
The MAP were:
Soil map classification of study area 1 : 250000 scale
Geology map of area 1 : 250000
forest map of area 1:25000
topography map of area 1:250000
Hydrology map of area 1:250000

Sensor	Date	Pixel	Scale
Landsat-TM image	june1989	30x30	100000
	june1990	30x30	100000
	july1991	30x30	100000
	jaunary1993	30x30	100000

Landsat-TM	Designation	Wavelength
CCT.july1993	1	0.45-0.52 um
	2	0.52-0.60 um
	3	0.63-0.69 um
	4	0.76-0.90 um
	5	1.55-1.75 um
	7	2.08-2.35 um

spectral bands of the sensor

Fig.2 IMAGE OF STUDY AREA - 1989

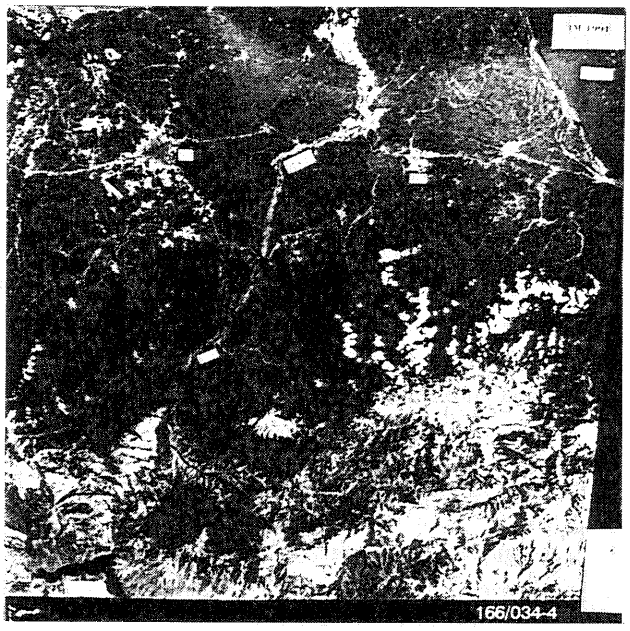


Fig.3 IMAGE OF STUDY AREA - 1991

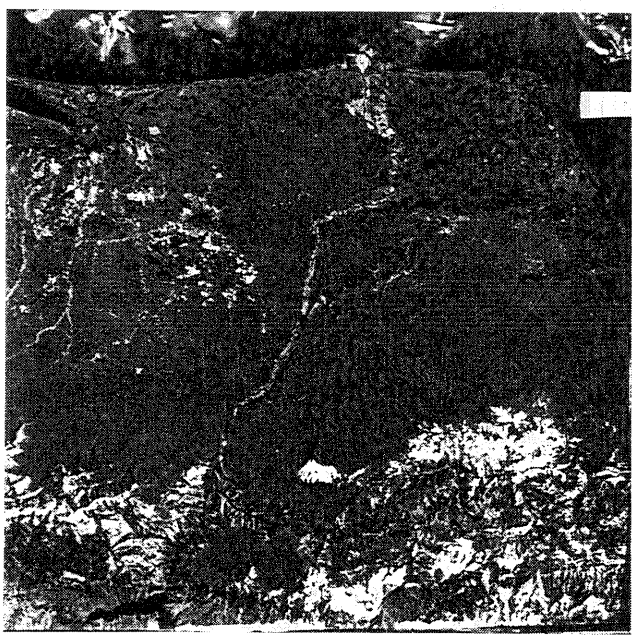


Fig.4 IMAGE OF STUDY AREA - 1989

3.1 - FIELD WORK

With these recognition units , a quick traverse was prepared, in the filed to collect ground truth on landuse map, physiography, for preparation of the maps corresponding to the land use map, other scientist have also collaborated various natural resources.

4. DIGITAL IMAGE ANALYSIS

digital image processing is the numerical manipulation of digital image and includes preprocessing, enhancement, and classification

4.1 - Preprocessing:

In the initial processing of the raw data to collaborate image radiometry correction, geometric distortions, and remove noise.

4.2 - Enhancement :

Image enhancement produces a new enhanced image, that is displaied on (CRT), this enhanced image may be easier to interpret than the original image in different ways, for example, more efficient use may be made of the original information.

4.3 - GEOMETRIC CORRECTION

After processing raw data and apply projection properties of a map Which is called geometric correction, a related technique were called registration, to utilizing of the coordinate system of one image to apply of same map or a second image of the same area, for example landsat TM image of a given area might be obtained for different dates and the user may wish to measure changes that have occured in period of time, the correction with two image of map, a map can be defined as a graphic representation on a plane surface of the earths' surface.

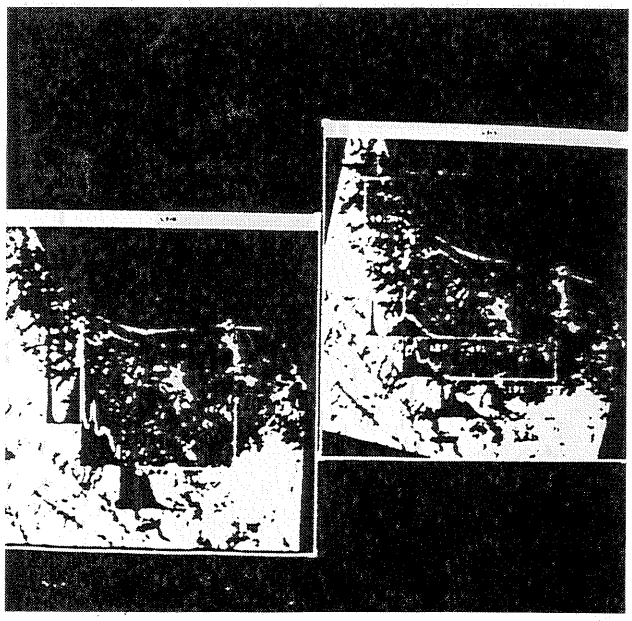


Fig.5 GEOMETRIC CORRECTION OF STUDY AREA

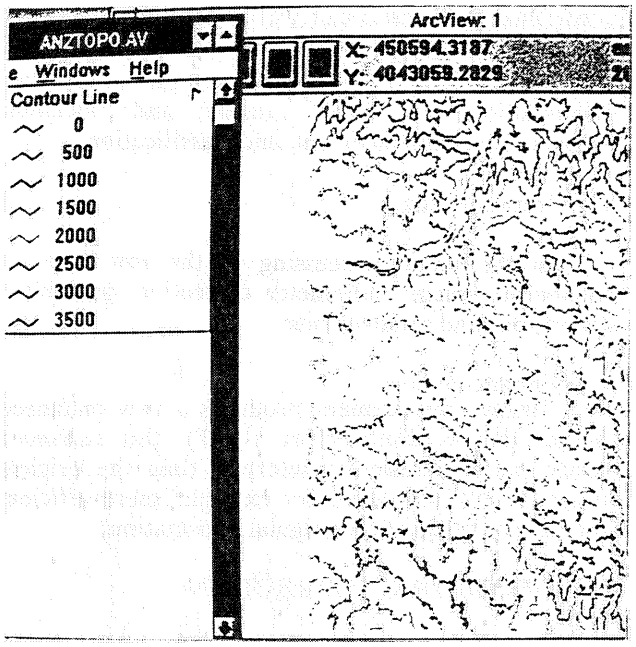


Fig.6 TOPOGRAPHY IMAGE OF TEST AREA

5.LAND USE MAP

It has already been stated that TM data were scanned in the june july 1989 1990 1991 and 1993, when the land surface in the region is most harvested or in some place was not harvested of crop, in this condition operation of map detailed information about landuse was recorded, while studing the forest unit and soil capability of the area, all these information along with the new data from the survey of Iranian topo sheet to convention of different scale, and available data relating to various correlated image characteristics, were used to prepare the map, acoording landsat imagery,the index of TM data, with topo maps index of 1:100000 scale, gilan province recorded approximately 11 mapsheets was delineated.

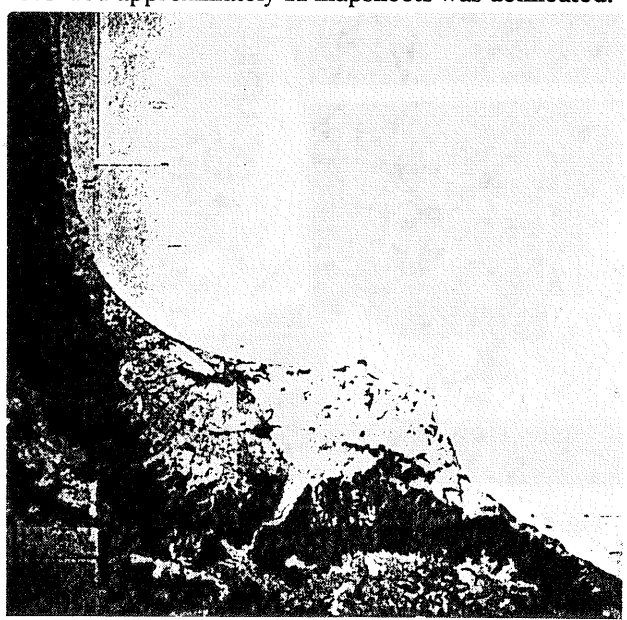


Fig.7 IMAGE OF LANDUSE CLASSIFICATION MAP

Fig. LAND USE MAP LEGEND

IRRIGATED LAND

- without limitation or low limitation	I1
- with limitation	I2
- nonirrigated land	DF
- orchard	O
- tea	T
- olive	OL
- mix with crop land and orchard	I0
- mix with orchard and crop land	OI

FOREST LAND AND WOOD LAND

- high density or medium density forest	F1
- low density forest	F2
- mixed forest and orchard	FO

RANGE LAND

- high density or medium density	R1
- low density range	R2
- mixed range and nonirrigated land	RD

BARREN LAND

- salty land without vegetation coverage	SL1
- salty land with native vegetation	SL2
- sandy dume	SD
- bare land	B

WET LAND

- reed bed	RB
- swamp	SW

SURFACE WATER

- natural lake	L
- dam lake	L1
- permanent river	Y
- seasonal river	-.-.-.
- canal	= = = =

URBAN BUILT - UP LAND

- urban area	U
- constraction	U1
- airport	
- main rode	---------
- secondary road	- - - - -
- railway	---------
- international boundary	
- province boundary	

ESTIMATION OF LANDUSE UNITS IN GILAN PROVINCE

LANDUSE UNITS	SHEET NUMBER									
URBAN AREA AND BUILT-UP										
IRRIGATED FARMING										
MIXED-ORCHARD AND CROPLAND										
OLIVE										
TEA										
FOREST										
RANGE										
DRY FARMING										
REED BED										
SWAMP										
DAM LAKE										
POOL										
SANDY BEACHES										
BARE LAND										

PERCENTAGE OF LANDUSE UNITS IN GILAN PROVINCE

LANDUSE UNITS	URBAN AREA & BUILT-UP	FOREST	RANGE	IRRIGATED FARMING	DRY FARMING	TEA	OLIVE	MIXED-ORCHARD AND CROPLAND
AREA(Ha)	20913	580345	238108	206222	40934	35378	9588	151934
PERCENTAGE	1.5	41.7	17.1	14.8	3	2.4	0.7	10.9

LANDUSE UNITS	SANDY BEACHES	DAM LAKE	POOL	BARE LAND	SWAMP	REED BED	& TOTAL AREA OF PROVINCE
AREA(Ha)	13662	2670	4242	6380	4959	18330	1391368
PERCENTAGE	1	0.2	0.3	0.5	0.4	1.3	100

& TOTAL AREA OF GILAN PROVINCE INCLUDING FRONTAGE OF ROADS AND RIVERS

CONCLUSION :

Due to the wide spectral range of TM data, the better manipulation ability would be provided for analyst in th different stages of image processing. In the other hand, the sufficient number of TM spectral bands which causes more collection of ground features would be concerned to define the better detailed landuse units and consequently, the more detailed information would be extracted from relative land use maps.

It is obvious that using the other kinds of satellite data (SPOT,COSMUS,...) combined with TM data and integration of visual and digital interpretation could provide the more useful and correct land use maps.