DETERMINING THE NEGATIVE EFFECTS HAPPENED MIDDLE OF IRAQ AFTER THE FLOOD OF 1988

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Poster Presentation

KEY WORDS: Remote Sensing, Landsat, Environment, Flood, Change Detection, IRAQ

ABSTRACT:

During the last 7 Centuries Tigris river had 38 extensive flood, The last one happened at 1988, Many areas covered with water with increase the level of ground water that caused many Negative effects on Agricultural areas near the river, To determine that series of Landsat satellite images used for years (1972-1988-1990) and digital supervised classification had done to calculate the areas of many classes (Water bodies -Salty soil- Bare soil- Vegetation- Unchanged areas) .The result showed that salty soil increased after the flood with 39% near the channel and about 439% far away the channel because of the increase of ground water level ,that mean real disaster . To determine the critical level of river water that pass over the levee of river we used 3D program that showed the level of (14m.sl.) consider safety level but at level (16m.sl.) been critical level and in (17m.sl.) the water pass over the levee and cover the areas around the channel and new extensive flood happen.

1. INTRODUCTION

1.1 Rivers

The Rivers was and still one of the most important natural effective thing in IRAQ, On their blanks the old man constructed his civilizations as the Assyrian and Summarian, They used the Rivers in Agriculture, Human uses, Navigation and at last in his Industry. The Rivers not always give the good but also the threat and destruction for peoples and agricultural lands also cities near the channels by floods when the water pass over the banks and levee to cover the areas around.

1.2 The Negative Effects

Any effective flood has many negative effects as:

1.2.1 Destruction the urban: When the water pass over the banks that mean the water being in touch with urban causing bad damage to the buildings – Highways and main roads – Power stations – Communications …etc. (Hoyt; Langbein, 1966) .

1.2.2 Destruction of Agriculture: Most of Agriculture areas near the rivers such ac in Iraq, That mean the possibility of covering and destruction is very high, And many cases of damage can happen such as:

1. Losing of upper soil by erosion when the water moves rapidly and there are no heavy vegetation soil there. (AL-Jarrah, 1995).
2. The vegetation may cover by layer of fine sediment (Silt, Clay) when the water moves slowly.
3. When the water level in the channel reduces the passing water may came back to it this cause small secondary channels and grooves in the banks.
4. .The evaporation of floodwater leaving the salt and other heavy mineral there.
5. The rising of ground water to the surface can bring the salt and other material, also new salty swamps may form (Hoyt; Langbein, 1966).

2. HISTORACAL FLOODS OF TIGRIS RIVER

Tigris River since the Quaternary period has great power and activity at the Mesopotamian peoples. The historical documents mentioned that about 26 times the river had destructive flood (Sosa, 1963). When the scientific records began since 1915 about 12 floods mentioned, Last one at 1988, Many areas at middle and south Iraq covered by water and that caused later negative environmental effects.

3. STUDYING AREA

3.1 Case Steady

The flood of 1988 take place in middle and south Iraq, For this studying we choose sample area near Kut City (N 32 ˚ 00` - 32˚ 30`) (E 46˚ 20` - 46˚ 50`) to show the effects happened there.

3.2 Geology

This area part of the flood plane of Tigris River covered by Quaternary sediment with no outcrops, Soil there very rich to Agriculture. Some eastern part built by alluvial fans (Buday, 1980).

3.3 Topography

The Area in general is flat, with any significant feature except some hills far to northeast, Range of elevation about (15 – 16) meters above sea level, the general slope toward West and South (Fig 1). Always the Eastern banks of the River higher than the Western banks, for that the flood water may cover these Western banks.

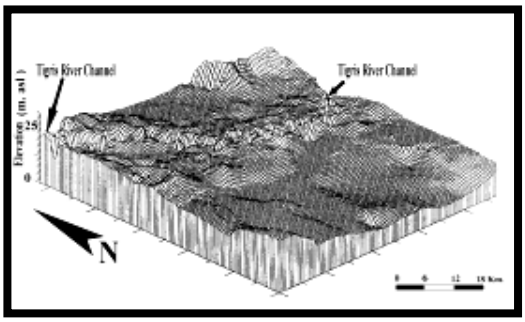

Fig (1) The topographic View of the area

3.4 Tigris River within the steadying area

In the middle of Iraq the Tigris River being at old stage that mean wide – shallow – high meandering and low speed of flow, Six small towns there direct to the channel of river also the Kut main City (Soyuzgiprovodhooz, 1981).

4. FLOOD OF 1988

The flood of 1988 affected on middle and south of Iraq, With two different ways:

1- Direct from river water when it's pass over the banks and cover the adjacent areas (This was limit in this flood).

2- Non direct because of rising the ground water level, This effect was very active and many of new salty swamps appear far of river by the effect of general topographic slopes.

5. DETERMINING THE EFFECTS OF THE FLOOD

Series of Satellite images used to determine the changes and effects before and during then after the flood period:

1 – Landsat – MSS, 23 March 1975.
2 – Landsat – TM, 23 April 1988.
3 – Landsat – ETM, 15 April 1990.

Fixing the scale and matching with ground control points was done then applied the Maximum Likelihood of Supervised Classification (Sabin, 1997). Five classes have been choose for that Water Bodies – Bare soil – Sabkha and Salt – Vegetation – Unchanged areas to calculate the area of these classes within and after the flood. The results showed the effect of flood by direct way (see 4 above), Table (1)

Class	The change of 1990 to 1988
Water Bodies	+ 1 %
Bare Soil	- 17 %
Sabkha and Salt	+ 39 %
Vegetation	+ 28 %
Unchanged Area	14 %

Table 1. The changes caused by flood in direct way

The negative effects obvious in increasing the Salty Areas and Sabkha also the decreasing the Bare Soil by changing to salty areas and swamps.

About the non-direct way the result calculated by same method with computer but this done with two steps of comparing for periods before and after the flood, Table (2)

Class	The change of 1988 to 1975	The change of 1990 to 1988
Water Bodies	+ 74 %	- 26 %
Bare Soil	2 %	- 80 %
Sabkha and Salt	- 44 %	+ 493 %
Vegetation	+ 3 %	+ 66 %
Unchanged Area	8 %	4 %

Table 2. The changes caused by flood by non-direct way

These results in general show disaster of environment in losing rich soil and increasing of the salty lands. Fig (2, 3, 4)

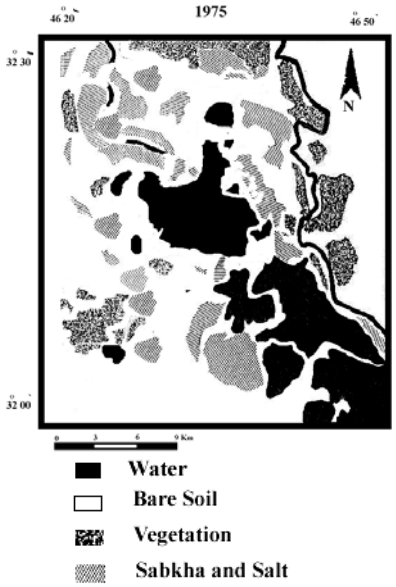

Fig (2) The area at 1975

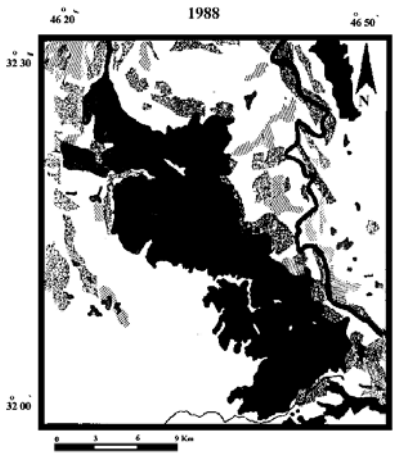

Fig (3) The area at 1988

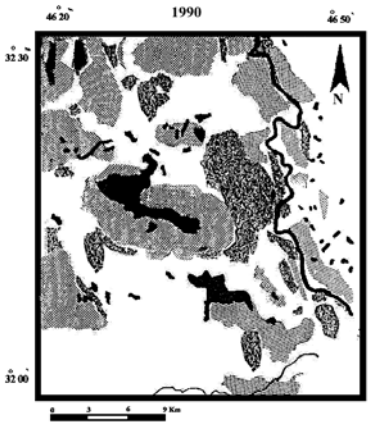

Fig (4) The area at 1990

6. The topographic effect on threatened areas

Many areas threatened by covering with floodwater directly from the river channel because of their low altitude comparing with that water level, That areas almost affect by the general topographic slope of the region that is toward the South and West for that the western banks of river may affect negatively with any flood, to determine that areas models of 3-d was building by using real Topographic data and Surfer software version 8.2, Then with any altitude we can determine the prospecting level of water may reach , The level of 14 m. above sea level consider safety case but at 15m. It's critical case (Fig 5), At level 16 m. the flood began (Fig 6).

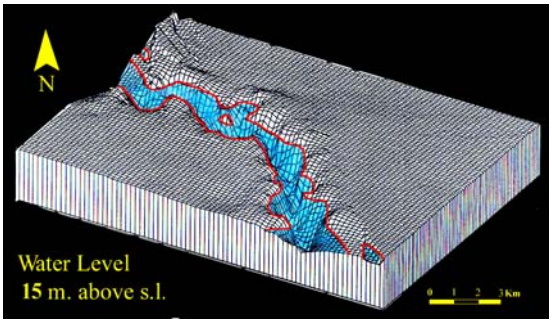

Fig (5) Water level at 15 m. (Safety case)

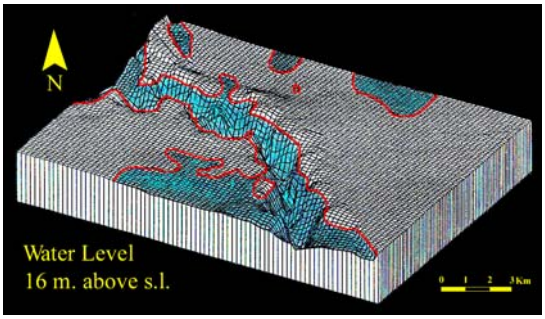

Fig (6) Water level at 15 m. (Flood case)

But at level 17 m above sea level the water cover large areas and we call that case disaster.

7. CONCLUSION

The flood of 1988 cover many low areas directly by channel water or by rising up the ground water to the surface carrying the salt and other mineral to agricultural lands causing loose of the rich soil. The level of 15 meter in the river channel consider critical case but at 16 meter the dangerous begin for that the banks must built up and rising with constructions to 18 – 19 meter to get safety situation at that altitude specially to the southern and western banks because of the direction of general slope of the region conformable with that directions. Many deep channels must digging up to be reservoirs for salty underground water in critical times. In general the natural environmental balance is very accurate at that flood because when the salty areas increase with percent 468 % and that negative criteria the Agricultural areas increase with percent 64 % and that positive criteria, That happened when the simple farmers began to leave the agriculture lands adjacent to the river to a new agriculture land far away of the dangerous threaten areas for that a new agriculture lands appear in that place with decrease of bare soil. But still the flood one of the most environmental negative effect of Tigris River.

REFERENCES

AL-Jarrah, O., 1995. Photometric study of Tigris River (North Iraq) with the add of Remote Sensing techniques, Ph.D. Thesis, Baghdad, Iraq, P.208.

Buday, T., 1980. Regional Geology of Iraq, S.O.M. Press, P.445

Hoyt, W., Langbein, W., 1966. Floods, Princeton University Press, P.469.

Sabin, F., 1997, Remote Sensing; Principles and Interpretation, 3 rd Edition, New York, W H Freeman and company.

Sosa, A., 1963, The Historical Baghdad Floods, P1, AL-Adeep Press, P.352.

Soyuzgiprovodhoz, 1981, Gross-Section survey of the main Rivers in Iraq, Stage 2, Ministry of Irrigation, Baghdad, P. 53.

Acknowledgement

I would like to thank Mrs. Tahrer Adnad and Mrs. Afraa abdel AL-Kalek (Space Research center) for their help.