التقييم الجيومورفولوجي والمورفوتكتوني لحوض طاووق جاي / محافظة كركوك/ العراق

أ. م .د رعد جلال فتحي
كلية الآداب / جامعة كركوك

أ.م. د أزهر حسين رزوقي
كلية الآداب / جامعة كركوك

أ.م. د سوسن جبار عبد الرحمن
كلية الآداب / جامعة كركوك

المستخلص

تضمن البحث التطبيقات الجيومورفولوجية والجيوتكنيكي لحوض طاووق جاي / محافظة كركوك ،
تم اجراء التحليل الجيومورفولوجي للأشكال الارضية لمنطقة الدراسة ، ومن خلال استخدام الصور الجوية ذات مقياس رسم 1:130،000، والخرائط الجيولوجية وما توافر من بيانات جيولوجية ، حيث رسمت خارطة جيومورفولوجية لها ، والتي وثقت حقليا ،بعد
ذلك تم تصنيف الاشكال الارضية لمنطقة الدراسة الى ثلاث مجموعات اعتمادا على أشكالها والعمليات التي ساهمت في نشوئها ، حيث ميزت الاشكال الارضية الجيومورفولوجية ذات الاصل التركيبي – التعروي ، والاشكال الارضية ذات الاصل التعروي ، والاشكال الارضية ذات الاصل النهري .

بينت عملية التحليل للمقطع الطولي لنهر طاووق جاي بأن هنالك تأثيرا مباشرا للعوامل التركيبية والصخارية على سلوك ونمط النهر من خلال التغيرات المفاجئة في انحدار المقطع الطولي له كاستجابة للتشويه الحاصل نتيجة لتعرضه الى نشاط تكتوني .

Geomorphological and Morphotectonical study of the Tawuq chai sub-basin Kirkuk Governorate - Iraq

Assist. Prof. Dr.
Raad Jalal Fathi
Dept. Applied geography
Kirkuk University

Assist. Prof. Dr.
Azhar Hussein Razooki
Dept. Applied geography
Kirkuk University

Assist. Prof. Dr.
Sawsan jabbar Abdul Rahman
Dept. Applied geography
Kirkuk University

Abstract

This study involves the geomorphological and morphotectonical Investigation of the Tawuq sub-basin located at the Kirkuk Governorate in North Iraq.

The geomorphological analysis and mapping of the area was carried out using aerial photographs and geological data landforms were classified into three groups depending on

their shapes and formation processes such as the denudational- structural, denudational, and fluvial.

The longitudinal profile analysis of the Tawuq Chai River revealed that the structural and lithological factors were controlled by the changes in the river gradients as the result of the tectonic activity.

Introduction:

The present geomorphological and morphotectonic studies for the sub-basin rivers of Tawuq chai for the Kirkuk area in north of Iraq are insufficient, However, there is existing morphometric studies for the Adhaim basin undertaken by AL- Khashab and AL- Talabani (1984).

They divided Tawuq chai to four secondary sub-basins depending on the water area , depending on it's tributaries.

The study involved the classification of the geomorphological units for the area using the historical data on the development of the above mentioned sub- basins related to Hydrology and sedimentology.

Study Area:

The study are covered an area of about 8104 km2 which is located in the Kirkuk Governorate of north Iraq lying between the longitudes of $44^{\circ}00 - 45^{\circ}\ \bar{1}0$ east and latitudes of $34^{\circ}\ \bar{4}5$- $35^{\circ}\ \bar{4}5$ north (fig.1) .

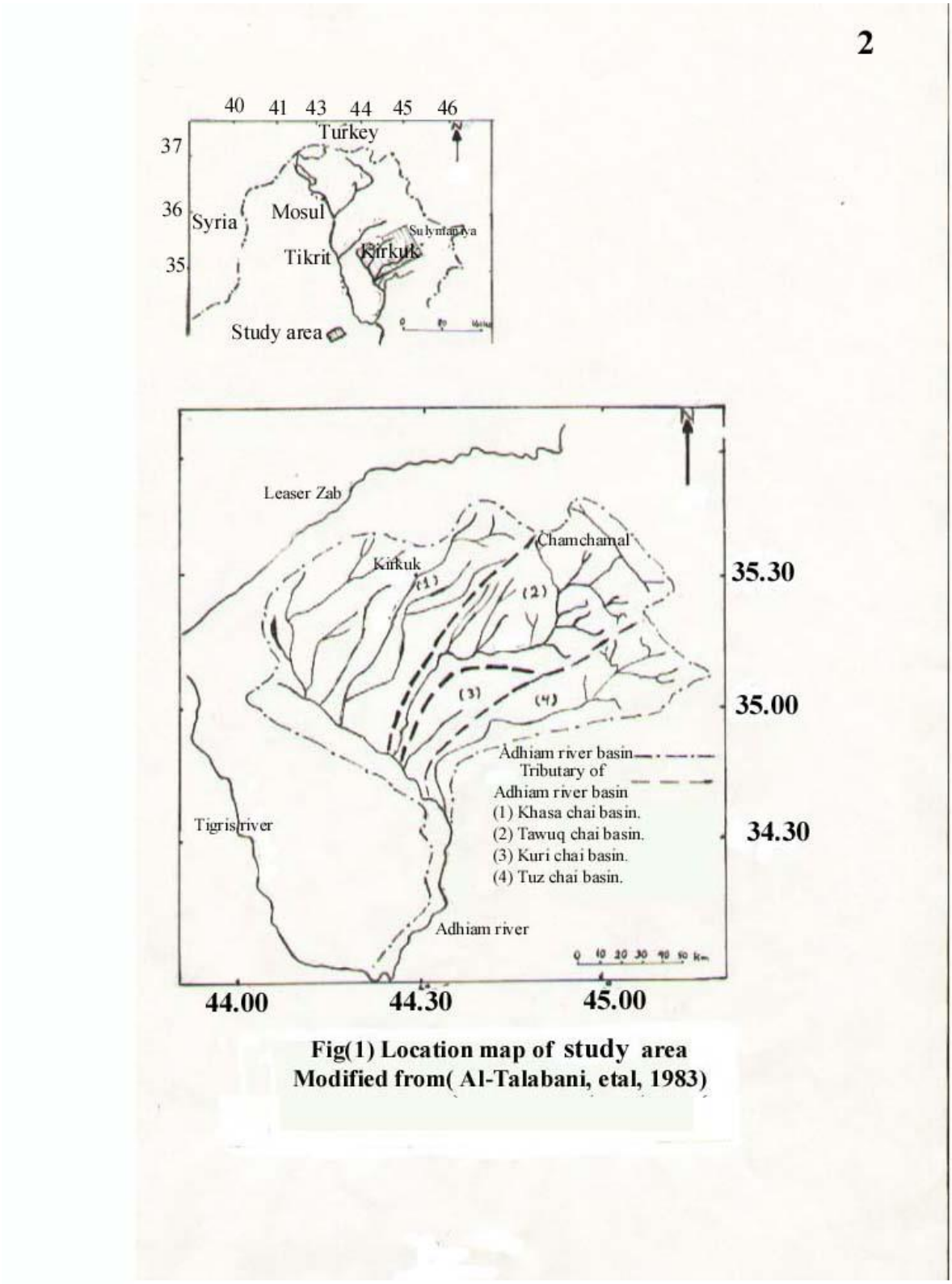
Material and Methods :

The study was conducted by using :

* Topographic maps scaled 1:100,000, to draw longitudinal profile river sections.

* Geological maps, of 1:1,000,000, and 1:100,000 scales prepared by the Iraqi geological survey.

* Aerial photographs of 1:130,000 scale with black and white lateral and vertical overlaps of 20 to 30 % and 60 to 70 % respectively, to determine the geomorphological shapes,trends , patterns ,and location as stated by Verstappen (1974) .



Fig(1) Location map of study area
Modified from(Al-Talabani, etal, 1983)

Geology:

Both rivers cross cut different geological formations with ages from the lower Paleocene to the upper Eocene .

These formation are the kolosh – Jerkas – Pelaspi –Fatha - Injana- Maqdadia – Byhassan kocho and Al-Azzawi, 1980 and (Buday, etal ,1987) .

The deeper parts of the foothill zone are characterized by the long conspicuous anticline which are separated by broad synclines in both surface and subsurface geology and usually in-filled by thick Pliocene and Quaternary sediments (Hamza & Domas ,1987) (fig.2).

Structure:

The area lies between the two main fold zones of the region (the high folded zone and foothill zone) which are separated by QaraDagh and consists of anticlines, synclines , faults ,and secondary folds that are responsible for it's geomorphological development (fig.3) .

The formation of pelaspi and it's old rock structures form the high folded zone while the formation of fatha , Injana , maqdadia, byhassan from the foothill zone structure

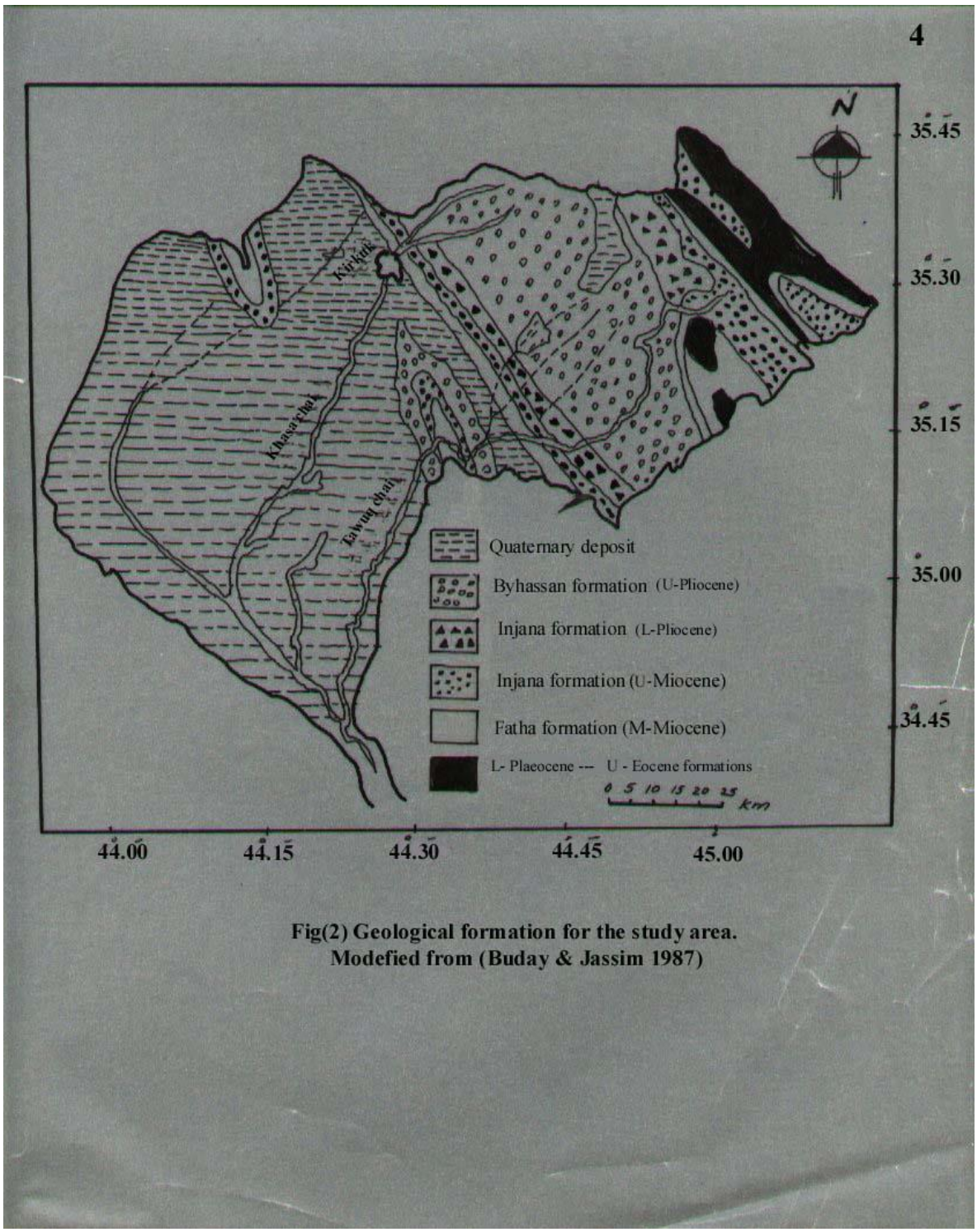
These structures are effected by the Alpine orogeny which led to the development of a symmetrical anticlines, synclines and faults, with dipping south west flanks (Bull, and Knenpfer, 1987).

Results:

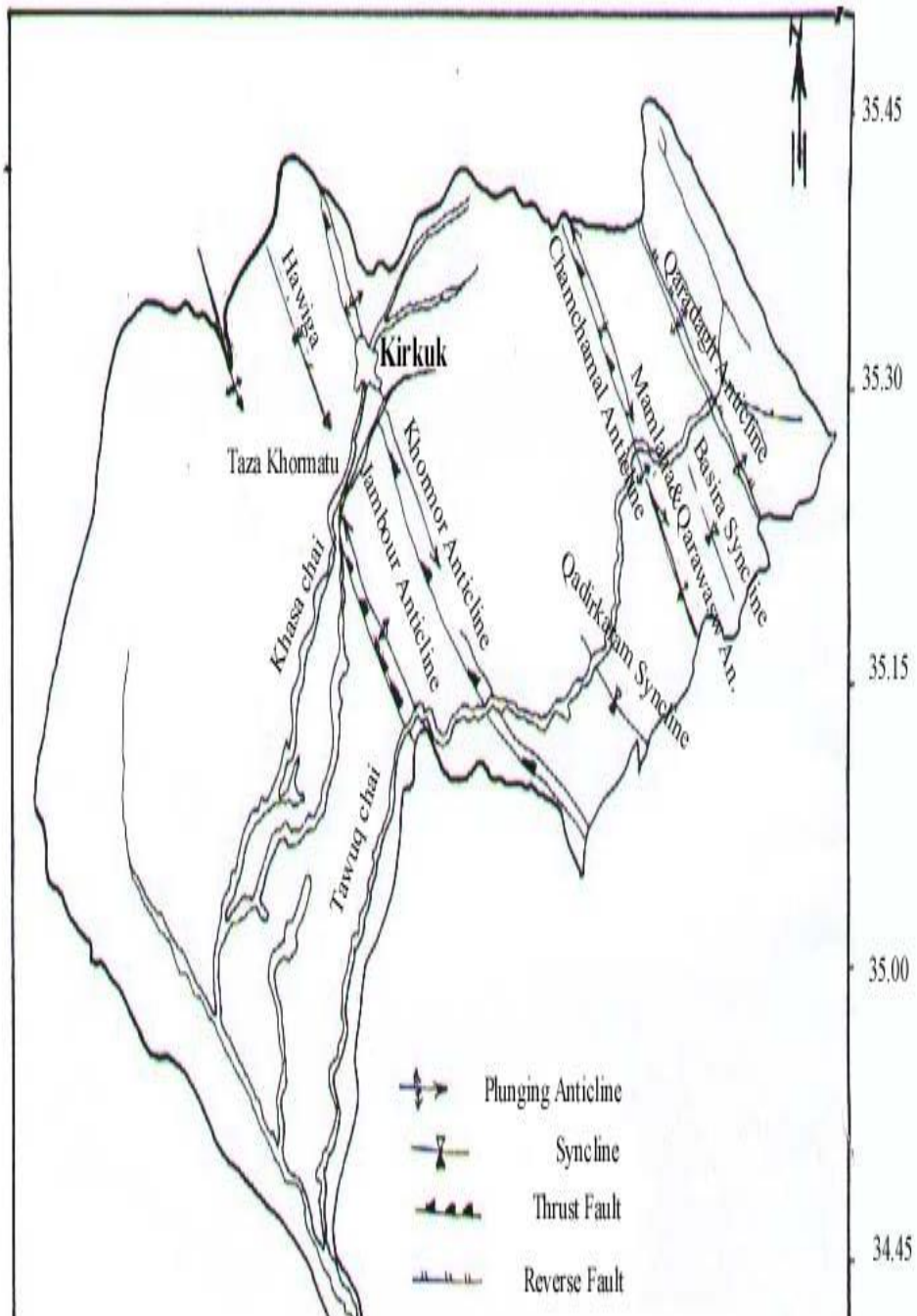
The Geomorphological analyses revealed the presence of three different units in the study area based on the International classification of the ITC (Zuidam & Zuidam,1979) & (Mekel,1978) these are: A) The land form of the central structural ridges lying in the core of the Anticlines of the area, the monoclinical structure, which is the questa, Hogback, and Dike-like ridge .

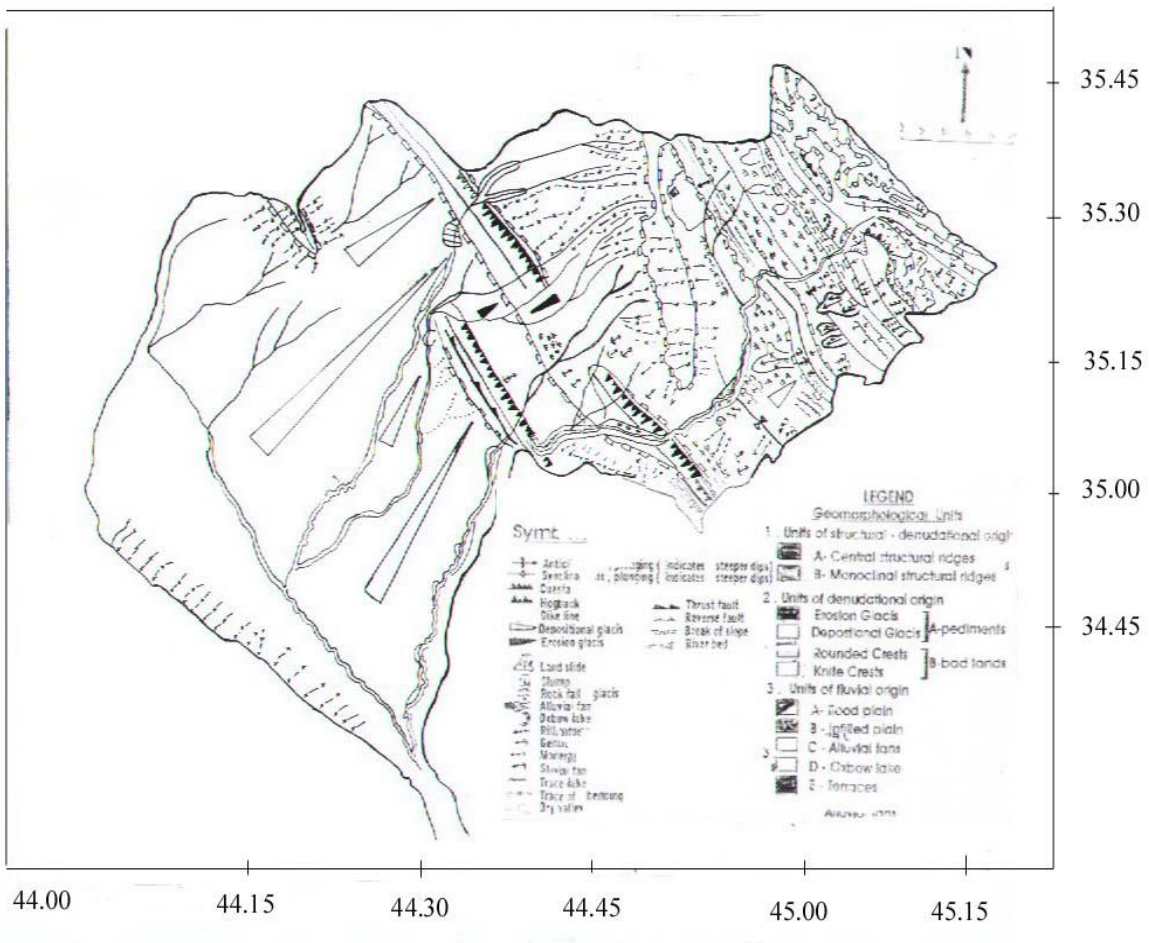
B) The landform of denudational origin involved three geomorphic features. i.e., the Pediment classified as the erosional Glacis and the depositional Glacis and the bad lands that have formed from the land slides.

C) The landform of the fluvial origin involves the flood plain , in filled valleys, alluvial fans, oxbow lakes and river terraces. (fig.4).



Fig(2) Geological formation for the study area.
Modefied from (Buday & Jassim 1987)


35.45
35.30
35.15
35.00
34.45
Kirkuk
Hawiga
Taza Khormatu
Khasa chai
Tawuq chai
Jambour Anticline
Khormor Anticline
Charmchamal Anticline
Qaradagh Anticline
Mamlaha&Qarawas An.
Basira Syncline
Qadirkaram Syncline
Plunging Anticline
Syncline
Thrust Fault
Reverse Fault



Fig(6) Geomorphology map of the study area (Interpretation from aerial photographs)

The structure factor and lithology , and it's effects on the behavior and pattern of the river was studied at a longitudinal profile by topographic maps (scale 1:100,000) with contour intervals of 50m .

The sudden change in the gradient value of the longitudinal profile (the knick point) , was determined to show the factors causing the disorders in the regional structural equilibrium.

The convex shaped longitudinal profile of Tawuq chai indicates that there is a balance between erosion and deposition (Bull, 1975) , which is also indicated by the three knick points (fig.5).

* The first knick point is effected by the Qaradag fold at an elevation of 700m, which is also effected by a reverse fault , and the reverse fault is affected by the west limb of the fold, that is in responsible for the changing lithology leading to the development of the jerkas-kolosh contact of the pelaspi formation .
* The second knick point is effected by the Mamlaha fold at an elevation of 500m through a fold which causes the increase in the gradient of the longitudinal profile to 10m .
* The third knick point corresponds to the Jambor fold on a 300m altitude which is parallel to the Jambor fold axis and Jambor faults.

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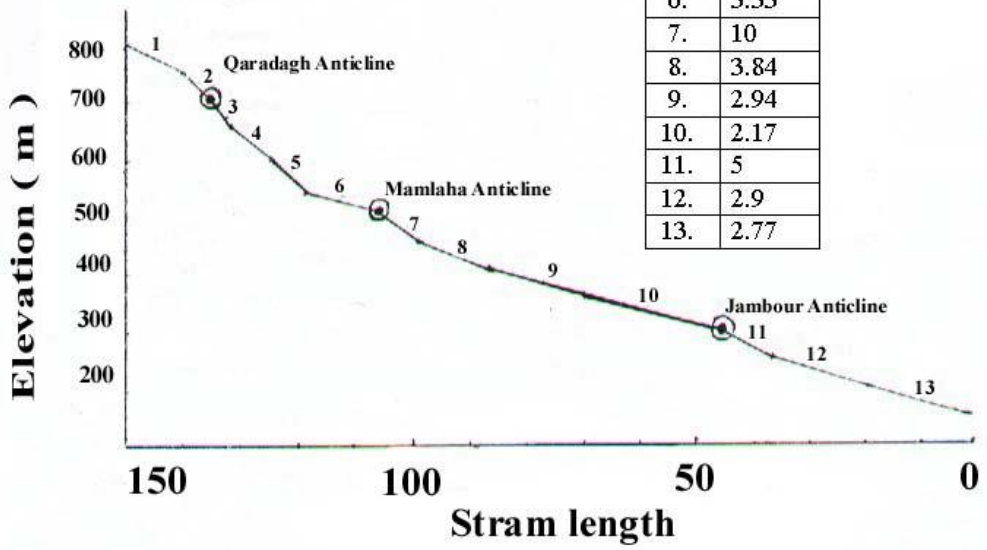
Discussion and Conclusion

The geomorphological analysis of landforms in the study area was carried out using aerial photographs and supported by field work. The different lithological units based on landform shapes, are not effected only by the lithological formation and structure of the area but additionally by other factors as well. More than one geomorphological unit was determined in the area because of the difference in the lithological dip in the same layers.

The lithological boundary of the rock formation corresponded to the geomorphological boundary. The longitudinal profile analysis of the Tawuq chai river showed that there was a direct influence of the structural and lithological factors on the rivers behavior and pattern through the sudden changes in its gradient as a response to the deformation caused by the tectonic activity in the area.

8

No.	Slope M/Km
1.	4.16
2.	12.5
3.	16.6
4.	7.14
5.	8.33
6.	3.33
7.	10
8.	3.84
9.	2.94
10.	2.17
11.	5
12.	2.9
13.	2.77



Fig(5) Longitudinal Profile of Tawuq chai

References:

AL- Khashab, W.H., AL-Talabani. N.J., 1984; Geomorphology of AL-Adhaim River , Scientific Research Council , Water Resources Department- Technical Report No. 8.12. A.

AL- Talabani , N.J., Salih , A. E. , Ridha , N.H. ,and Mustafa, S. A., 1983 , basin , scientific Research council ,Water Resource Department- Technical Report No. 8.2. A.

Buday , T. , and Jassim , S.Z., 1987 ; The regional geology of Iraq VII ; Tectonism , magmatism and metamorphism, D.G., Geoghdad –Iraq .352 P .

Bult , W. B. , 1975 ; Allometric change of land forms , Geo. Soc. Am. 86 : 1489 -1498 .

Bull , W. B., and Kneupfer , P.L.K., 1987 ; Adjustments by the chawell River , New Zealand , to uplift and climatic changes, Geomorphology 1:15-32 .

Hamza, N.M., and Domas, J., 1980; The geology of the Adhaim area. SOM. No. 1381.

ITC (Internation Institute for Aerial survey and Earth sciences), 1975; ITC system of geomorphological, chapter VII -2, 52 P.

Kocho, K.L., and AL- Azzawi, A. R., 1980; Regional geological mapping of Adhaim River basin , SOM Report No. 1087 .

Leopold , L. B. , Wolman , M. G. , and Miller , J. P. , 1964 ; Fluvial processes in geomorphology , W. H. freeman and Co. , Sanfransisco, 522 P.

Mekel , J.F., 1978 ; The use Aerial photographs and other Image in Geological mapping , copyright Intonation Institute for Aerial and Earth science (ITC) Ensceheade , The Netherland, 206 P .

Verstappen , H. Th., and Zuidam , R. A., 1975 ; ITC system of geomorphological survey , International Institute for Aerial survey and Earth sciences (ITC) . 350, Boulevard 1945 , Enschede , The Netherlands .

Zuidam, R.A., and Zuidam, F.I., 1979; Terrain Analysis and classification using Aerial survey and Earth sciences (ITC) , the Netherland , 310 .