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RANDOMLY MINING OF RIVER DEPOSITS AT AL-MANSURIAH DISTRICT AND IT'S EFFECTS ON ENVIRONMENT AND ECONOMY

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ABSTRACT:- Study area is within lower Diyala, downstream of Diyala weir. The river deposits along Diyala River and extends to a distance of about 15 kilometers downstream of Diyala weir.

Diyala basin is divided into three parts as follows, upper Diyala. Above Derbendikhan, middle Diyala! From Derbendikhan to Diyala weir and lower Diyala. From Diyala weir to Baghdad. Origin of gravel deposits at study area are the mountains of catchment of Diyala River. There is no outcrop on the surface but only alluvial sediment deposits with thickness of 70 meter.

Gravel deposits include all rounded particles coarser than 2mm, and they are used for manufacture of concrete for building, highway, in the roads as sub-base and in earth dam as a filter. Impacts of dams on sediment yield are restriction supply of gravels to lower Diyala basin. There are more than (80) gravel pits installed along Diyala river on both sides.

Total dissolved solids of Diyala River at study area for a period of one year (2009-2010) have got the highest reading (768 ppm) and lowest reading (470 ppm) and annual average (580 ppm) with an increase of (106.2 ppm) for previously studied at 1991. Effect of randomly mining on environment is the reason behind the morphological changes of Diyala River and became more or less as artificial drainage. The removing gardens in flood plain and leaving water pool without levelling. The effect on economy is clear through the daily production that reaches approximately (6500) cubic meter and the local government should pay more attention to save this national property.

INTRODUCTION

The river deposits along channel of Diyala river consists of all types of gravels and extended to a distance about 15 kilometers downstream of Diyala weir, (Fig-1) .Width of gravel deposits include bed of channel and flood-plain area as well as river terraces on both sides of Diyala river. These gravel deposits of good indication, which can be used as a tool to analyze the climatic regime, type of rocks, and relief of catchments area. Gravel pits began at mid of nineteenth century on small scale nearby Diyala weir, but from beginning of 1970, the needs for construction materials were increasing rapidly. So that many gravel pits and crushing plants which are installed along Diyala channel, are only on right bank at that time. The gravel pits were controlled according to the laws and legislations of local authority and supervised by geological survey which is responsible about regulation of mining operation. But during the last two decades and due to heavy exploitation of sediment deposits, many gravel pits became out of order, and looking for new areas becoming very necessary. For this reason many new gravel pits are installed on both banks of Diyala river, after removing fruit plants without taking any care to environment and economy because of working in prohibition areas. In this research Diyala basin is divided into three parts as follows, upper Diyala:above Derbendikhan, middle Diyala: from Derbendikhan to Diyala weir, lower Diyala: from Diyala weir to Baghdad.

ORIGIN OF GRAVEL DEPOSITS AT STUDY AREA

The sources of materials of study area are the mountains and slopes which are situated within catchment of Diyala river basin. The middle and upper Diyala basin is characterized by high mountains with steep slopes so the depressions and vallies are covered by all types of gravels. Since the scree materials or talus accumulate along mountain slopes as a result of physical action. So the amount of transported gravels from the source area to deposits place depends on the flow energy of Diyala River especially during rainy season, when flood occur due to precipitation. So the volume of transported sediments and volume of depositions are proportional to the intensity and periods of Diyala River flood. Sorting takes place, so that the coarsest gravel is deposited nearby weir eventually.

GEOLOGY AND GEOMORPHOLOGY OF STUDY AREA

There is no outcrop of bed or rocks appear on the surface at lower Diyala basin, the alluvial sediments deposits, are loosely compact and composed of pebbles at the channel bed and mixed of sand, silt and clay. At the banks the thicknesses of sediments are more than 70 meters, detected from ground water drilling. These sediments are of Quaternary age, (Buday, 1980).

At the beginning of lower Diyala basin near the wire, the wide of the river is changeable, from 380 meters at the wire to 250 meters at a distance of 15 kilometers down stream. The river profile has slop of about 1.4 m/km until about 5-6 km below the wire, where the river soon enters the friable soils of the plain in which the regime slope appears to be only 10 cm/km, (AL-Aansari and AL-Jabbari, 1987). Diyala River from the weir till confluence with the Tigris River, Southern Baghdad, flow in vegetative area, which is planted by diffrint types of fruits. These field fruits are irrigated by Al-Khalis and Al-mushtric canals or irrigated by using pumping method either from Diyala River or from under ground wells.

RIVER DEPOSITS

Gravel deposits, represent the local accumulations of channel fillings, and river terraces Stream deposits are the most common and generally most desirable because:

Individual pieces are usually rounded;

Streams exercise a sorting action which may improve grading; and 3) abration caused by stream transportation and deposition leads to a partial elimination of weaker materials, (Hilf, 1978). A gravel deposit consists of a frame works of pebbles between which are voids. The voids are rarely empty, being occupied by sand, silt or clay material. Clay also may form a coating about pebbles, surface coating generally reduce the value of gravels as concrete aggregate, this and/or soft and loosely adhering surface coatings are particularly suspect. Clay and gypsum coatings, however, can often be removed by screening and washing. The shape and surface texture of the pebbles in a gravel deposits are influenced by the agent responsible for its transportation and the time taken in transport, although the shape is depends on the initial shape of the fragment which in turn is controlled by the fractures pattern within the parental rock. Gravel particles can by classified as rounded, irregular, angular, flaky and elongated (Bell, 2007).

Gravel includes all rounded particales coarser than 2mm in diameters, pebbles range from 2-64 mm, cobbles range from 64-256 mm and boulders are coarser than 256 mm, (Plummer et.al, 2007). The grain size was large which can be easily measured and described with the help of three axes.

a) Maximum length.
b) Maximum width.
c) Maximum thickness.

The degree of flatness (a-b) / 2c.

The degree of roundness of a pebble is 2r/L, where:

L- Longest dimension of the pebble,

r- The smallest radius of curvature of the least rounded part of the pebble, (Reineck and

Singh, 1980).

THE EFFECT OF DAMS ON SEDIMENT YIELD

Part of the eroded material which travels through the drainage network to down - stream measuring or control point is referred to as the sediment yield, (Hilf, 1978). The source of sediment in study area are totally from watershed of upper and middle Diyala basin, transported by tributaries of Diyala river, as a result of weathering and erosion of pre-existing rocks or precipitation from solution, The transportation of sediments by water is either by suspended or as bed load. Gravels move as a bed load by rowing and sliding, so these material will transport from the source to place the of deposition on condition, there is no obstacles on the river flow.

With the relation to the study area the gravel deposits are periodically increase or at least there is annual addition of gravel deposits in spite of continuous mining. But as soon as constructed dam on the river flow, the situation will getting deference due to detention of water.

So that after the construction of Derbendikhan dam in 1962, the amount of transported materials by Diyala river effected up to some extent, and amount of receiving gravels in lower Diyala basin decreased, but not stopped. The existence many tributaries within middle Diyala basin acted as a source supply of gravels. And when Hemrin dam

operated at 1980 the condition has absolutely changed due to deposition of whole load of sediments at the reservoir of Hemrin dam, that the supply to lower Diyala basin was restricted.

RIVER DEPOSITS USES

Sand and gravel are both needed for the manufacture of concrete for building and highway construction. Sand is also used in mortar, which holds bricks and cement blocks together, (plummer et; al; 2007). The sands which are using for making silica bricks or for manufacture of glasses should be almost pure quartz or the purities should be not less than 95%.

Sand and gravel are very essential in the construction of roads. They used as sub base and on the latter stages they used in paving. Also the sand and gravels used in earth dam as a filter on shells while clay in core of dam and riprap as a protection in the upstream of dam.

GRAVEL PITS AT AL-MANSURIAH DISTRICT

In a typical gravel pit, equipment for moving and utilizing gravels, like power shovels. Dragline, scrapers, bulldozers, bucket Wheel excavators, blade graders are used (Plate1). The material is dug from the face by a mechanical excavator, and this loads the material in to trucks or to a conveyer that transports it to the primary screening and crushing plant. After crushing, the material is further screened and washed. This sorts the gravel in to various grades and separates it from sand friction, (Bell, 2007). In study area, more than (80) gravel pits are installed up to now, located along Diyala river on both sides, beginning from Diyala weir and ended nearby the last village of sherween canal, for a distance approximate 15 kilometers in length and less than 2 kilometers in width.

Many gravel pits had been shut down due to operating for along period in limited area. So the owners of these closed gravel pits start searching for new borrow area which is located within the flood plain. These new area are already occupied by gardens, and invest in these location will destroy the fruit plants and that’s what was happened. The gravels of flood plain are require special treatment before use because highly heterogeneous in character and the deposits covered with thick over-burden, which it has to be removed before mining (Singh, 1975). Also problem of water table in gravel deposits facing the digging, because of gravels are highly permeable and the pits usually occurred under the

level of the channel bed. So that it is easy to see a pool among gardens. After the end of exploitation of the deposits the pits have been abandoned without dumping or leveling that due to highly cost.

TOTAL DISSOLVED SOLIDS (TDS) OF DIYALA RIVER AT STUDY AREA

Total dissolved solids, includes total positive and negative ions, it is measured by the (ppm) or (mg/l) units. Concentration of the (TDS) in water of river influences by many factors, like type of rocks and soils in contact with it, human activities along and neabours to water flow, agricultures, artificial, drainage, nets, fertelizer of soil, and waste materials. Concentration of the (TDS) in water is a direct indicator to the water quality. Water pollution is any things that degrade water quality. Surface water pollution is often both highly visible and of the most common threats to environmental quality (Cunningham, et,.al.2007).

Chemical analysis achieved for water samples from study area for a period of one year (2009-2010) with monthly, sampling.

The result of the highest reading was (768 ppm) and lowest reading was (470 ppm) with annual average (580 ppm). While the annual average of (TDS) of Hemrin reservoir and for the same period (2009-2010) was (453 ppm). By comparism with result of previous study of the same station obtained from the same author, it was (473.8 ppm). That means there is increasing in (TDS) by (106.2 ppm), and that indicates the Diyala river become more polluted.

EFFECTS OF RANDOMLY MINING ON ENVIRONMENT AT STUDY AREA

There are a lot of effects on environment at study area, some of them are due to mining, gardens removing and the other reason was due to the construction of dams. So when the dams are constructed at the upstream of Diyala river .as mention before, as a result of these dams, the water discharge to lower Diyala basin became under control. So that there was no natural flood happened since 1980, except the large flood in 1988 and that was not a normal flood which occurred as result of rainy storm, but happened, due to critical circumstances at that time. The authorities of ministry of irrigation decided to cut and removed the gates of Derbendikhan dam spillway and at same time the gates of Hemrin dam spillway have been lifted, to protect Hemrin dam from failure. The water discharge to lower

Diyala was (4000) cubic meter/second, and lasted for 20 days. The regulation of discharge from Hemrin dam highly effected the morphology of Diyala river and started gradually to lose its character as a natural river, and became more or less as artificial drainage .

The second reason was gravel pits and mining without taking care to the laws and legislation which is legislated by local authorities and under the supervision of Geological survey. So the owner of gravel pits after digging and exploiting the materials from the pits, they left the overburden accumulated on side of Diyala channel and throw much of waste material to the river flow or near by the channel. In flood plain the excavated pits changed to water pools.

The third reason was due to the cutting and removing of the gardens in Diyala flood plain and these gardens became places for gravel pits. So all the three reasons are behind of environmental change at study area and it must be taken into consideration.

EFFECTS OF RANDOMLY MINING ON ECONOMY

To estimate the amount of gravel materials in cubic meter, which is daily digging and loading onto trucks from the whole gravel pits at study area, and to approach this objective, the following methods had been applied.

The first method was by asking the owners of the gravel pits directly about amount of daily production and registered that weakly, to take the average production of each gravel pit individually, and collect all the daily production of pits at study area. But this method was unaffected and did not give a real quantity, especially when we do kind of comparing between the numbers of loaded trucks and the result of calculating data.

The second method was selecting a check point which whole the loaded trucks pass through it. Classified these loaded trucks according to their loads and recorded for whole day and for one day a weak and for a period six months.

The result of calculation was the daily average production of the gravel pits in study area 6500 cubic meter. So the local government should pay attention to such production, as a national property and to be sure whether all the gravel pits working according to the laws and legislations or not. To take a wise steps to save this national property.

CONCLUSIONS AND RECOMMENDATIONS

Mining of river deposits by more than 80 gravel pits ,situated downstream of Diyala weir have been studied .The effect of gravel pits on environment are very conspicuous either through deepening bed of Diyala channel which became isolated pools , by removing natural sand bars within channel flow ,or on flood plain through cutting fruit plants and leaving pits without levelling. Effect of gravel pits on economy are clear through observing the digging in prohibition area ,close to Diyala weir watching less than 3 Km and in flood pain without permission.

On basis of mentioned above the following recommendations are suggested :

1. strict on operation of digging and exploitation of gravels, and to control river deposits reserve.
2. activation of supervision on production and places of gravel's exploitations.
3. watch the steps of excavation and apply the laws and legislations which regulate and manage the relation between the local government and the owners of gravel pits.
4. emphasis on levelling all the pits within flood plain and encourage the farmers to replant then.
5. monitoring Diyala channel banks by all directorates which concerned with conservation of environment.

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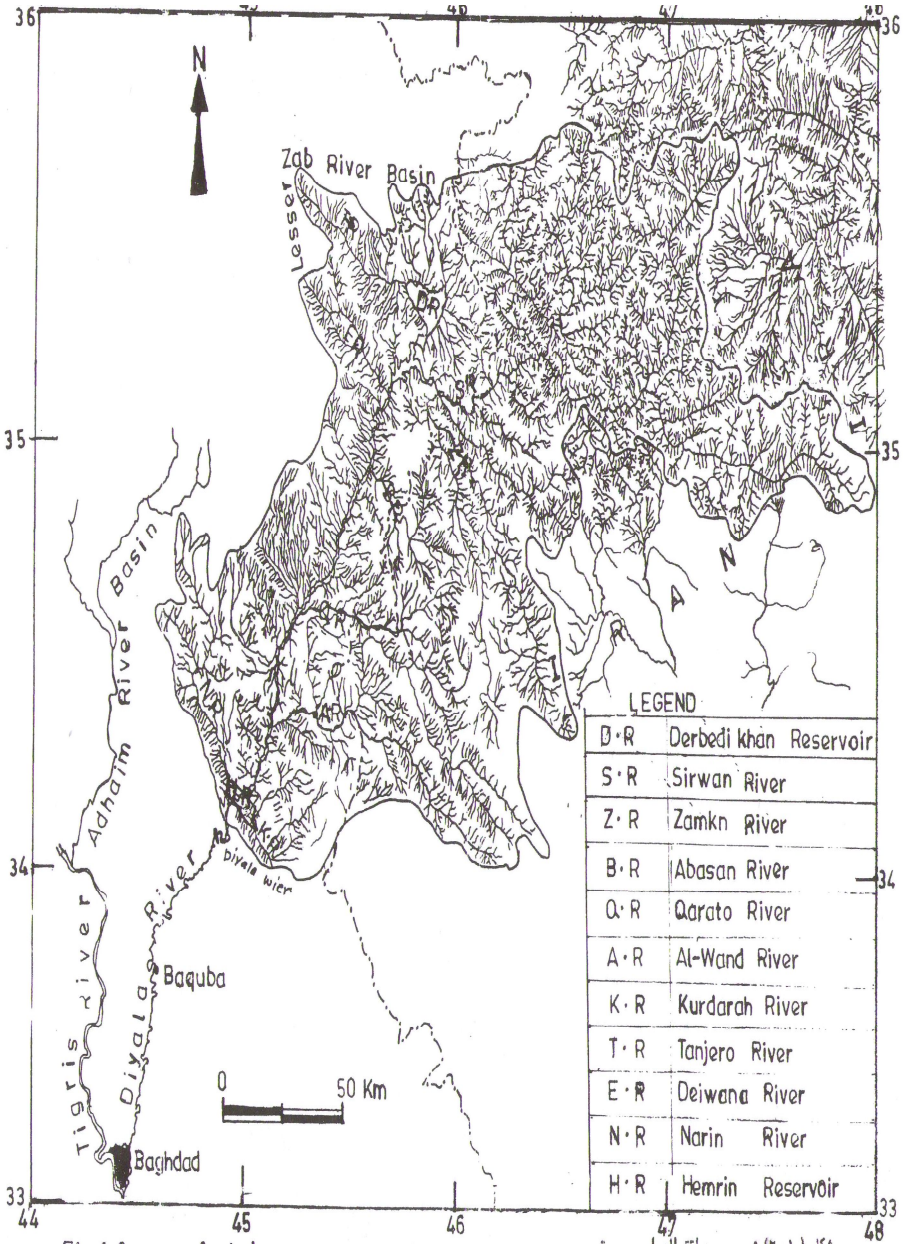
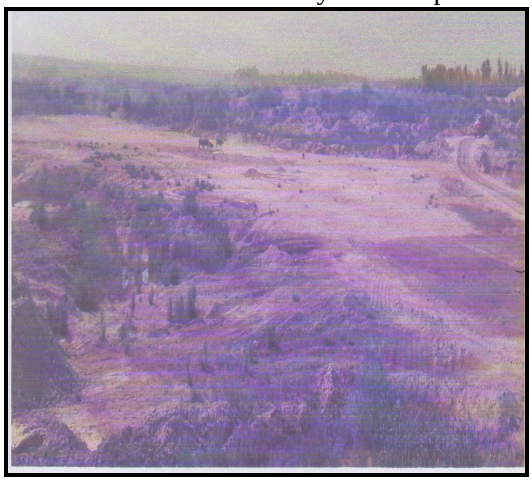


Fig.(1): Map of Study Area (After Al-Jebouri, 1991)

a- Gravel pit at bank of Diyala river

d- Excavation within Diyala flood plain

b- Factory of cement brick at bank of Diyala river



e- View of Diyala river-right bank

c- Pool of water after excavation with flood plain

f- Both banks of Diyala river

التعدين العشوائي لترسبات نهر ديالى في ناحية المنصورية وتأثيراته البيئية والاقتصادية

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الخلاصة

تقع منطقة الدراسة ضمن حوض ديالى الأسفل بالقرب من ناظم ديالى وتمتد المسافة 15كم أسفل ناظم ديالى وعلى امتداد مجرى النهر. قسم حوض ديالى في هذا البحث إلى ثلاث أقسام وكما يلي :حوض ديالى العلوي ويشمل مناطق أعالي دربنديخان وحوض ديالى الأوسط: يشمل المناطق المحصورة بين دربنديخان وبين ناظم ديالى، أما حوض ديالى الأسفل :يشمل المناطق المحصورة بين ناظم ديالى ومدينة بغداد . مصدر الترسبات النهرية في منطقة الدراسة هي المناطق الجبلية الواقعة ضمن منطقة التغذية لنهر ديالى ،وتنعدم فيها المكاشف الصخرية على السطح وتظهر الترسبات النهرية فيها فقط ويصل سمكها إلى 70 كم وتشمل الترسبات النهرية كل المواد الحصوية والرملية والتي تنحصر أبعادها أكثر من 2ملم وتستخدم في صناعة الكونكريت لغرض المباني والطرق السريعة وفي أسس الطرق والسدود الترابية. يوجد في منطقة الدراسة أكثر من 80 مقلع على امتداد نهر ديالى والمسافة 15 كم وفي كلا الجانبين والدراسة انحصرت في الجانب الأيمن من النهر. التحليل الكيماوي لمجموع المواد المذابة في نهر ديالى ولمدة سنة كاملة (2009_2010) كانت كما يلي أعلى قراءة (768ج .م .م) وأوقل قراءة (470 ج . م .م) وكمعدل سنوي (580 ج .م .م) وبزيادة قدرها (106.2 ج.م.م) مقارنة بدراسة سابقة ولنفس الباحث علماً إن المعدل السنوي لمجموع المواد الذائبة في بحيرة حمرين ولنفس المدة (2009 _2010) كانت (453 ج .م.م) . التعدين العشوائي للترسبات النهرية ولعدم مراعاة القوانين والتشريعات الخاصة بالتعدين والمشرعة من قبل الحكومة المحلية و تحت إشراف هيئة المسح الجيولوجي وكان السبب في أحداث تأثيرات بيئة مهمة على نهر ديالى ,منها فقدان النهر لخواصه الطبيعية وتحوله إلى ما يشبه المنزل الاصطناعي نتيجة إزالة البساتين التي ضمن الحوض الفيضي وتعدين الترسبات التي فيها وتركها بعد التعدين على شكل برك مائية دون إجراء تسوية لها. إما التأثيرات الاقتصادية فتتمثل فيما تنتجه هذه المقالع من كميات من الحصى والرمل وبمعدل يومي يصل إلى (6500) متر مكعب فقط من منطقة الدراسة وبما أن هذه الترسبات هي ثروة وطنية فيجب على الحكومة المحلية وهيئة المسح الجيولوجي إن تأخذ الموضوع بنظر الاعتبار والحد من التجاوزات الغير قانونية .