Using GIS and remote sensing technique to show the historical geomorphology and water management of The Assyrian civilization

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abstract:-

The end of Assyrian kingdom was in (612 B.C), they ruled about 3000 years, their capitals were located in northern part of Iraq. This part still in area which determine by erosion system of rivers such as Tigris River, Al_Koaser River, Great Zab River etc.

No doubt the ancient civilization of Iraq were depending upon agriculture. From this above observations as well as by the help of resent technique this research might be showing us to that vast management of water and their ways which used at that time for uplifting water when absence of machines were there.

This paper will show the methods used at that time for managing water either for agriculture nor for irrigation, such methods will support by many maps and images to remove the haziness which are surrounding it today.

The important result of this paper lead us that: there were high technique for managing water in time of Assyrian to cover all that areas surrounding their capitals in north of Iraq which now this areas suffering to do such projects. In the areas having erosion actions otherwise whole of it will buried and will not guide to such research as in southern parts of Iraq.

Introduction:-
Most capitals or large cities of Mesopotamian civilizations were located near the sources of the main rivers. The trace of their irrigation systems project through aerial technique are neither buried by depositions action nor eroded through valleys action to lift away the main channels of rivers in these days, both above geomorphological actions will lead to un-continues of that irrigation projects or slaking.

The most famous project of irrigation in ancient of Iraq time was the hanging Garden, the way of its irrigation still unknown up to this time. This study depending upon recent technology as well as to field work as a result of geomorphological action, the evident of it will seemed as trace from that time till now.

The Assyrian civilization which lactated on northern part of Tigris River in Iraq this part considering as sub folded areas which need higher technique to control the water management of it. The Assyrian depended upon their higher knowledge which most of it are uncovered till now. The king Sennacherib (705-681 b c) negating the idea which say (the discharge of their water nor the rainfall was more) as he indicated in his inscriptions near the beginning of the one of his projects to irrigate Nineveh.(( The fields of Nineveh were dried as grave, when there were no water to its peoples to irrigate their fields they started looking towards sky waiting for rains......)) (Sousa, Ahmed 1986).

The Assyrians had four capitals Assur, Durshrukeen, Kalhuo, and Nineveh for e.g. they irrigated all area surrounding Nineveh in same way happened to all of those above capitals. The irrigated area around Nineveh reached more than 2000 square km at that time, which located in north and north east of resent Mosul city to managing water to their capital Nineveh, that happened through joining valleys with each other’s and constructional many different types of dams. Some of those dams were to storage water nor some of them to change the directions of their irrigation cannels at that time. No doubt the source of that water was out of the main river as Tigris although it was located directly on it, due to the height in level of Nineveh with comparative to Tigris, So that we can divided these irrigation projects into two types; the First one the projects out of the bands of Tigris River and the projects on the bands of Tigris River.

The water management out of the bands of Tigris River

Some of those projects shown through inscriptions which written by the Assyrian themself especially in the resent period of their empire in my opinion the most notation of those projects comes to the light through this period, as a result to their progress in these field because they collected other civilization experience either from Mesopotamians civilization nor other civilizations.

In the year(698 B c.) Senncherib started his harvesting water from Al_Koaser river when his chronicling lead us to that (David Oates 1968) he digged some of the drainage of above river to make it deeper and wider to gain more water in his seven years of ruling in area of (812.99 square kilometres).
In (690 B.C.) he opened his largest project when he joined the two basins that were Al-Koaser River and Al-Komal River (574.84 square kilometres) by his channel when he suffered that: the water of Al-Koaser River getting dry in summer seasons as in (fig. 1), in same way he controlled the water of another valleys located in the western side of Al-Koaser which its watershed earthwor is visible up to now*. Finally the area controlled by his projects reached to (1904.86 square kilometres)

* For more information look to (Jason UR 2003)
For more information’s the researcher want to show more details about such chosen area at that time, when there was no such technique which are a valuable in these day as in (fig : 2)

(Fig : 2) Showing different fill counter lines that chosen by Senncherib to succeed in his project

When Senncherib chosen that way of his channel faced in his way some valleys which needed high technique at that time to treat from him, so that he decided to construct bridge to across the water above it as in (fig:3)
(Fig :3) Showing Different photos of Senncherib bridge which are a part of his channel near Jurwannah village

Finally Senncherib mentioned in his notation has done lake by reconstruction the old dam which it’s place unknown till this studying. The survey and the experience of the researcher of more than twenty years guide him to the place of that lake and dam near Al Geelah in eastern sit of resent Mosul centre or close to northern east part of Nineveh historical city. For more information (Al- Naish & Jarjees 2010) as in (fig :4) shown
(Fig: 4) showing the position of Senncherib Dan and its lake

Such dam and lake be visible all among Al_Koaser river too. The capital Durshrukeen was mainly depending upon it. The other capitals of Assyrian were slaked in same ways which used above too as (Fig: 5) showing.

(Fig: 5) Giving view about Kalhuo and Assur capitals

The water management on the Main river(Tigris River)
This is another type of Projects which are visible in field more than inscriptions or slakes of Assyrian civilization due to the high discharge and large erosion of Tigris River among determination age, we can find three types of uplifting and transportation water methods, which were channels Parallel to main river, channels were token water from main river to its tributaries and Different types of dams on main river*.

The channels Parallel to main river visible very clear in meandering parts of Tigris River in studding area such as in the eastern part of Tigris River exactly in southern part of Al-Gayara bridge where natural and human actions are less with comparative to the same areas near resent human sits as in (fig: 6) shown

![The parallel historical channel](image1)

*(Fig:6) Showing ruined of the historical channels southern of Al-Gayara bridge*

While the channel was token water from main river to its tributaries is visible in southern part of Al-Mishraq mining to Al-Kassab valley which is considering as a field as unique case which is out of order now due to the erosion of Tigris in this area as(Fig :7) showing.

* For more information look to Al- Naish & Sultan (2006) .
While the final case of water management on the Main river of the Assyrian dams which are various in size and purposes*. When the size of the larger stone reach in size about (150 tons), Surely such work at that time will be a wonderful or might be considering now one of the stranger work of the of the world, when ancient civilization were not having such technique which is not a valuable in these day. The purposes of those dams are not for storage put for uplifting and transportation of water. These dams resisting the action of erosion for long time, due to the huge mass of stone which constructed by it as the first reason and the type of it as second one as(Fig:8) showing..

* For more information look to (Al-Naish 2000).
Conclusion:

As a result of this studying

This paper showing general irrigation system of Assyrian of age more than 3000 years on the Tigris River which it was in the resent northern part of Iraq which lead us to

The area of Assyrian irrigation Projects considered as the largest one among all the ancient irrigation Projects which reached for Nineveh only to (1904.86 square kilometres) as well as to capitals Assur, and Kalhuo while Durshrukeen included extension of Nineveh projects.

The fluvial plain of Iraq divide into two geomorphical zones that are erosional one in northern part of Iraq and depositional one in southern part of it, when the studying area located in the erosion on this paper dominating the idea that the Assyrian slaking projects should visible by aerial images and photographs which it will be higher in elevation than the resent running water in these case such projects will be lift its cannels above main rivers level or its tributaries, while in southern part of Iraq will be buried by the depositional materials.
References:


