

# Problems of urban land use on the bank of the Euphrates River in Habbaniyah district

Younus Hendi Olewi Al-Dulaimi<sup>1</sup>

*University of Anbar / Center of Strategic Studies/Iraq*

<sup>1</sup> Corresponding author: Younus Hendi Olewi Al-Dulaimi. University of Anbar / Center of Strategic Studies/Iraq. Email: [dr.younus1971@uoanbar.edu.iq](mailto:dr.younus1971@uoanbar.edu.iq)

## Abstract

Through the research, it was found that the study area includes different types of current land uses that do not comply with Iraqi legislation and laws in its location in addition to riverine, as several urban problems emerged from it, most notably pollution and abuse and their environmental effects in violation of the distribution of uses, after which a set of proposed solutions that contribute to the development of the banks of the Euphrates River in the Habbaniyah district, to promote economic activities, then concluded with conclusions and recommendations.

## Keywords

River, urban, uses, recreational, distribution and development.

## Introduction

Rivers banks are an important natural resource, given the importance of this vital artery to most countries of the world today, which has been linked to the emergence of civilizations and the establishment of many economic, cultural, entertainment and aesthetic activities. Correspondence to the importance of the place, through a comprehensive study of the reality of the state of the land, uses of the urban bank of the Euphrates River, to diagnose its problems, which the field study was adopted to reach its development, according to scientific principles and laws in line with the requirements of the population related to the questionnaire that they see to achieve sustainability in the Habbaniyah district.

### Research problem

1. Does the geographical distribution of the land use on the right bank of the Euphrates River on the urban side meet the requirements of the district's residents in terms of recreational, environmental, economic and environmental aspects, and is in line with Iraqi laws and legislations?
2. Has the spatial distribution of land use on the right banks of the Euphrates resulted in urban and environmental problems that affected the waters of the Euphrates?

### Research objectives

1. Highlight the aesthetic side of the river by using it as a branch to improve the environment and develop it to improve its economic and social level.
2. Activating the natural and recreational potentials of the river, by removing unwanted polluting uses from the bank and the river.
3. Improving the distribution of land uses on the banks of the river in line with the requirements of modern district residents.

### Research hypothesis

1. The geographical distribution of land uses does not comply with Iraqi legislation and laws and does not meet the requirements of Habbaniyah residents in terms of recreational, environmental, and economic terms.
2. The current distribution of land uses is unplanned and random and has resulted in several urban problems that affected the banks and waters of the Euphrates.

### The importance of research

The importance of this research comes in the Habbaniyah district, due to the importance it has acquired thanks to its embrace of the Euphrates River, which is the secret of life and its beating heart, which encourages its investment to raise the efficiency of its environmental performance on modern economic grounds.

## Study Area

Habbaniyah district occupies the eastern part of Anbar governorate, bordered on the north and west by Ramadi district and on the east by Fallujah district, and it is considered one of the main districts that are located on the international transport corridor and the Euphrates River agricultural basin in sub-tropical shows between the two latitude circles (10 33 - 48 33) north. And the two longitudes (26 43 - 32 43) to the east, see figure (1).

Habbaniyah area with an area of (714) km<sup>2</sup>, occupies the areas that connect two regions with different human, economic and cultural characteristics, as it combines two different environments (urban and rural). An aerial figure (2), characterized by the lack of diversity of the surface appearances, then the edge of the plateau ends and the sedimentary plain begins The fertility that forms the northwestern part of it, which

contributed to determining the general direction of the course of the Euphrates River within this region, which was consistent with the slope of the surface from the northwest towards the southeast, with an altitude ranging between (40-55 m) above sea level. The floodplain in it extended on both sides of the Euphrates River, where it contrasts with the left bank, which is characterized by its breadth, which has great agricultural potential due to the fertility of the soil and the availability of water, compared to its decline in the right bank of the river, to the supervision of the edge of the western plateau that embraces the urban side. Economic and service activity on the bank to be studied.

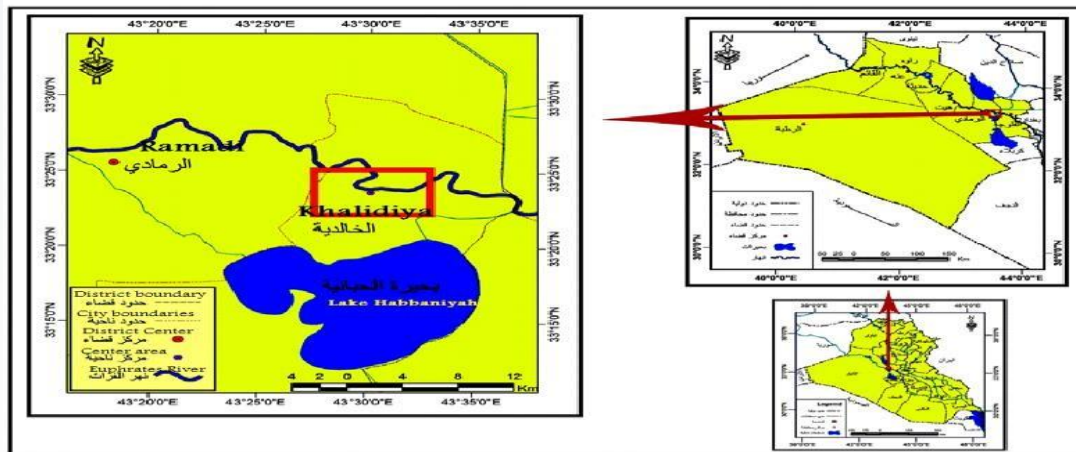


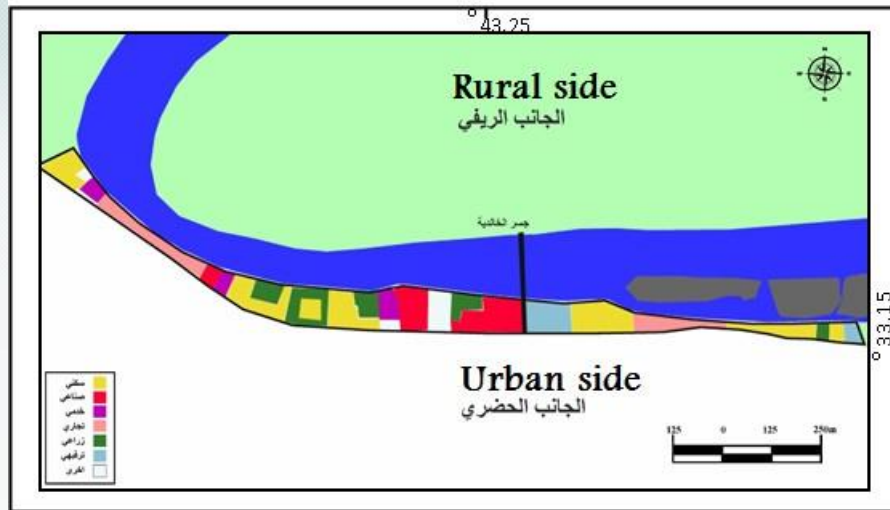
Figure 1. Show location of Habbaniyah area about Iraq and Anbar Governorate



Image 1. Show location of Habbaniyah area

### First, The spatial distribution of land uses on the Euphrates bank

The spatial distribution of land uses is one of the most important topics that concern the geography of cities, as it represents the imprint that a person leaves on his land, in addition to being a response to the human need and his advanced aspirations. Accordingly, the urban land uses of the Euphrates Riverbank were studied (Abbas, 1977; Adamo, Al-Ansari, & Sissakian, 2020; Al-Ansari, Ali, & Knutsson, 2014; Davies, 1957; Isaev & Mikhailova, 2009; Sulaiman, Kamel, Sayl, & Alfadhel, 2019), to identify the various changes in the locational succession, to reveal the reality of the current distribution of land uses through figure (1). The studied land-use area occupied (282923) square meters in the whole of the urban bank of the Euphrates River. Note Table (1) And figure(1). Among the most important of these uses are as follows:



Map 2. Show distribution of urban land use on the Euphrates bank in Habbaniyah district (2020)  
Table 1.

Show distribution of urban land use on the Euphrates bank in Habbaniyah district (2020)

S	Type of use	Area m 2	Percentage
1	Residential	111111	11.1
2	Industrial	13111	11
1	Commercial	11663	12.7
1	Agricultural	23611	1.1
3	Serviceable	21617	7.1
1	Entertaining	11113	1.3
7	Other	14111	1.1
Total		212421	166%

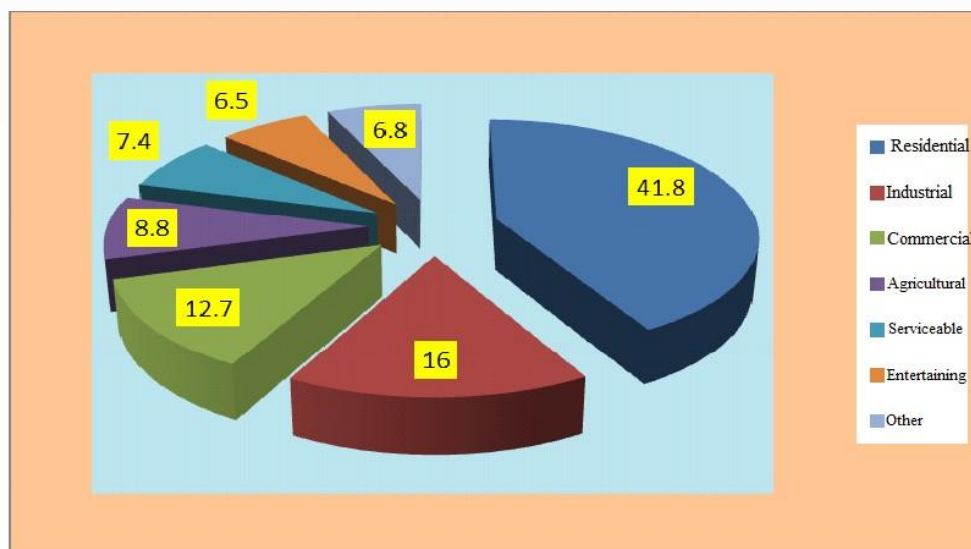


Figure 2. Show percentage of urban land use on the Euphrates bank in the Habbaniyah district (2020)

1. Residential use: The riverbanks are considered one of the most suitable sites for residential uses, which people generally tend to in establishing their homes, because of the environmental and recreational conditions that are secured for them, so the population has gathered in it because of its ownership, and it expanded gradually over time after it was agricultural, due to the absence of strict and deterrent laws to preserve it, in addition to the inability to purchase a residential piece due to the high prices of residential land (Yaqoub, 1981), so the residential use came with the highest area that occupied an area of (118138) square meters, at a rate of (41.8%) of the total uses The land in the study area, Table (1) and Figure (2).
2. Industrial use: Some of these uses based on the banks of the Euphrates were associated with the availability of water as an essential part of their production stages, which were automatically subjected to their spatial character for periods that are not short, which inherited the lack of planning controls that guarantee a parallel distribution. In light of its lack of development factors and basic structures, it was characterized by being a ready-made environment with its capabilities that provide benefits and services, as important centers of attraction for the workforce in the Habbaniyah district, as it includes most of the craft industries and mechanical workshops that are characterized by their smallness, such as blacksmithing and car repair as well as industrial factories such as milk, snow and construction (2) The industrial use occupied an area of (45138) square meters, at a rate of (16%) of the total use of the land in the study area, Table (1) and Figure (2).
3. Commercial use: It is one of the important uses that form the mainframe of the riverbank, which represents a longitudinal strip, along the main roads, through commercial activities that are unique to them, such as restaurants and shops mixed with other professionals, that people need By providing manufactured goods such as construction, ceramics, iron, and pipes, as well as spare materials for cars, and this region has maintained this importance to this day, and accordingly, the commercial use occupied an area of (36005) square meters at a rate of (12.7%) of the total land use in the study area. Table (1) and Figure (2).
4. Agricultural use: This use on the urban bank of the Euphrates River is characterized by suitability for agricultural production, due to the presence of fertile riverbed soil, water resources and the appropriate climate, but the area of this use is gradually diminishing, and the main reason is the inability to use agricultural From competition to other uses, not to mention the problems facing agriculture, such as stopping state support for this sector, as well as relying on imported production at cheaper prices, so the owners of these agricultural lands cut and sell them to benefit from it financially, in the absence of the authority of law prohibiting the transfer of agricultural lands To residential or commercial (1), and in general, this use still occupies an area of (25016) square meters at a rate of (8,8%) of the total land use in the study area, Table (1) and Figure (2).
5. Service use: The presence of the use of these services on the banks of the river was distinguished by the breadth of its impact on the city level, which the population needs periodically despite its smallness, such as the power station, drinking water and butchery, as well as the presence of garages for renting cars that are often signed In the city Centre, and other service uses necessary to serve the residents of the Habbaniyah district (1), this use occupied an area of (21067) square meters at a rate of (7.4%) of the total land use in the study area, Table (1) and Figure (2).
6. Recreational use: Each spot in the watersheds of the Euphrates River is an entertainment component and a magnet for recreational activities and sporting events that contribute to the psychological comfort of the human being. Recreational use in the urban bank is limited to private parks, five-a-side playgrounds,

and Al-Rashed Sports Academy. Which are important aspects that the residents of Habbaniyah district resort to, to practice sports and recreation, as they serve as lungs through which citizens breathe, to empty negative energies to reach pleasure and contentment with life, under the complex conditions of the city. (6.5%) of the total land use in the study area, Table (1) and Figure (2).

7. Other uses of the land: These were the vacant uses in all the urban banks of the Euphrates River in the Habbaniyah district. The occurrence of this use near the river exposes it to several problems, perhaps the most prominent of which is the abuse due to the need to use the land for its high value as a result of other factors such as economic competition. In addition to the social factors that greatly affected the spatial variation in the use of the land. This use occupied an area of 19144 square meters at a rate of 6.8% of the total land use in the study area, Table (1) and Figure (2).

## Second, The problems of land use on the Euphrates

There is no doubt that the problems of land use in the bank of the Euphrates River began before the basic design was drawn up, in the early seventies when the inhabitants of the surrounding areas resorted to it for purely economic reasons and then developed. The use of the questionnaire, which was distributed in the size of (150) selective questionnaires, by a segment of citizens that are related to touching the subject of the study, indicating that there are problems as follows:

1. Water pollution: water pollution is the corruption of its properties or a change in its nature by throwing harmful substances from various sources (Musa, 2006), especially liquid wastes resulting from human uses, such as residential or industrial stores and even hospital water by putting it into water. The river is direct without treatment, using a sewage network pumped through the extension of drainage pipes on the Euphrates River in the study area (2) Image (1), which causes its pollution, and this water is characterized by high concentrations of organic matter in it through the drained water, in addition to the spread of oils and pollution Water using agricultural pesticides for lands on the banks of the river, indirectly through its dissolution in the water and its infiltration into the river (3), which leaves an impact on community health and damage to biodiversity, as well as the high cost of producing pure water in the Habbaniyah district, and the analyzes have proven The laboratory does not comply with the environmental specifications issued by the Ministry of Environment, as shown in Table (2).



Image 2. Show drainage of liquid waste pipes in the Euphrates River in Habbaniyah district

Table 2.

Show results of the analysis of the Euphrates River water at the Khalidiya pumping station on 12/8/2020

S	Elements	Pumping station	Environmental determinants
1	Chemical Oxygen Need (mg / L) (COD)	150	Less than 40
2	Biological oxygen demand (mg / L) (BOD5)	41	Less than 40
1	Turbidity Tu	17	Less than 10
1	Sulfate (mg / L) SO4)	113	166
3	Phosphate (mg / L (PO4))	1,3	1
1	Total dissolved solid salts (mg / L) T.D.S)	2376	1366
7	Total suspended solid salts (mg / L) T.S.S	111	16
1	Oils (mg / L) O&G)	12	16

2. Distortion of the aesthetic of the city (Visual pollution): It is one of the types of environmental pollution and it means a distortion of any view on which the human eye falls upon looking at it, and we can describe it as a type of lack of artistic taste, or the disappearance of the aesthetic image of everything surrounding us (1), and in general, the region suffers from the problem of waste spread along the entire length of the riverbank, as if the river was found to dispose of waste instead of care for the banks and their cleanliness, establishing parks and enjoying the beauty of nature. Residential, industrial and commercial areas, as a result of not using efficient and effective means to dispose of them, led to the collection of unwanted waste from garbage (Abdullah, Al-Ansari, & Laue, 2019; Al-Hiti, 2010; Bari, 1977; Crist, 1960; Ghazal, Shaban, Mashi, & Raihan, 2012; Kibaroglu & Scheumann, 2011; Morozova, 2005; Salman, 2005) , food residues, paper, an empty glass, metal and plastic containers, remnants of clothes, building materials, wood and car bodies Image (2), not to mention agricultural waste From weeds and reeds, which became a breeding ground for rodents and insects, which formed serious pollution on its banks, in addition to that, taxis gathered irregularly, especially near the Siddikia Bridge, Which contributed to a fatal error in drawing the features of the negative image, associated with the misuse of the banks in various uses (2), which distorted the sense of spatial and general visual taste the aesthetic of the urban space of the bank of the Euphrates River.



Image 3. Show the accumulation of waste in the urban bank of the Euphrates River in the Habbaniyah district

3. Overlapping uses: This problem is one of the fruits of random growth, which caused confusion in the uses of land on the banks of the river, and overlapping with residential use, especially the various industrial workshops, shops, factories, restaurants and service departments on the side of the main street, For lack of conformity with environmental determinants due to its location on the banks of the Euphrates River in Habbaniyah district, distributed randomly according to the law of supply and demand, look at Image (3) since this conflict in the use of the land led to an obstruction to the development of agricultural and recreational places designated as a result of the erosion of agricultural lands. This, in turn, confused the process of expanding the rest of the uses of the banks of the river, which generated a polluting source close to each spot, and produced its negative effects on citizens, because the interference of these uses causes inconvenience (1), especially industrial workshops harmful to human health.



*Image 4. Show residential use overlapped with blacksmiths and tire repair shops in the urban bank of the Euphrates River in the Habbaniyah district*

4. Private property of the river frontage: the control of private property owners of the riverfront led to the different uses of the land in the study area, and this, in turn, deprived citizens of access to the river, as the owners of houses overlooking the river deliberately seized neighboring lands. For his home and he deliberately fenced it with an Image (4), and it became within his private property to dispose of it as he pleases, which prompted them to establish their role on the banks of rivers, because of the environmental and recreational conditions that secure them, as well as the case for other stores, where the spread of casinos and restaurants run by people has become widespread (Odeh, 2021), This is what we observe in the Al-Orouba neighboring, which hurts the riverbank because of the lack of clarity of a general axis of movement that reaches these spaces or connects them, so the new open spaces overlooking the river for these buildings remain of a background character as well.





*Image 5. Show the takeover of private owners of the urban bank of the Euphrates*

5. Trespassing on river boundaries: The line of trespassing on river boundaries, as specified in Iraqi laws and legislations, has been determined by the Ministry of Water Resources, through clear reimbursement along the river by a distance of 50 meters in the Habbaniyah district, to protect the banks of the river. As a result of the floods, the study area suffers from this problem, as several major areas have been identified exploiting the trimming line, especially after 2003, despite the issuance of a law prohibiting trespassing on the boundaries of the trimming line in (Alwan, 2009). Refinement as a result of the lack of maintenance, which led to the exploitation of lands within the boundaries of the line of edification for various uses, whether in building large housing units and the exploitation of agricultural lands as their gardens, as well as expansion through the burial of large parts of the river with construction waste resulting from the establishment of other activities to acquire the largest share of The banks of the increase in the area, Image (5), especially along the stretching strip of the urban bank in the Habbaniyah district (Al-Kaissi, 1984).



*Image 6. Show the sections of the line of irrigation are buried in the urban bank of the Euphrates River*

6. Lack of entertainment activities: It was found through a field study of the banks of the Euphrates River that the recreational use was limited to private parks, green areas, five-a-side playgrounds, and the Al-Rashed Sports Academy near the Siddikia Bridge, which are run by people and not for the general population of the district (2) , As it showed a clear shortage of space amounting to (18415) square meters, and this constitutes a clear deficit in entertainment activities, which are almost non-existent, as the per capita share has reached (0.1%) that does not meet the increasing demand for these services for the district's population of (131211) people, according to The estimates are in (2020), due to local and international standards that the per capita share of this use does not exceed (4%) in green areas (3), which means that it

remains below the required level in the riverbank, and therefore the Habbaniyah district suffers from deprivation in recreational service (Al-Shujairi, 2021) . As a result of not employing the appropriate places in a manner commensurate with the requirements of the size of the population, it needs to be developed and organized in a manner commensurate with the size of the variables occurring in the various parts of the judiciary, as well as other factors related to the community itself, including the society's culture, aesthetic values, and the behavior of people (Iraq, 2020). And economic factors represented in the standard of living of the individual, the factor of security and saf.

7. ty that has a great role in this field, and the inefficiency and sufficiency of this lack of use, many consequences such as the high percentage of moral and social problems among members of crowded families or residential neighborhoods that do not It has recreational services, and if it is found, it is inefficient and suffers from a severe shortage of recreational supplies, such as an abundance of chairs and places designated for sitting, roofing, and furnishing, and this we note that all areas of the Habbaniyah district.

### Third, The plan to develop the urban bank of the Euphrates River

For the success of any development plan, continuous interaction must involve the public opinion, which will give its positive repercussions on decision-makers with preservation and sustainability, and by surveying the desires of citizens in the study area, using the questionnaire distributed in the size of (150) questionnaires, the sample of which was selectively assigned to know the opinions and desires of the segment Which is related to the subject of the study, to develop the uses of the existing land on the river bank to be more appropriate to the environmental and aesthetic need (Al-Shabani, 2021) , with balanced planning that makes it a real sustainable (sustainable) pleasure for the general population of the Habbaniyah district, note Table (3).

Table 3.

Show percentage of citizens' opinions about the development of urban land use on the Euphrates River

Questions	Yes%	No%
Do you think that the uses of the land for the river bank are appropriate?	1	41
Would you like to remove the sewage pipes on the riverbank?	4181	181
Do you want to increase the excess of uses of all kinds on the riverbank?	4181	187
Do you want to migrate industries built on the banks of the Euphrates?	12	11
What kind of use would you like to have on the riverbank with your logic?	Agricultural 12	Entertaining 11

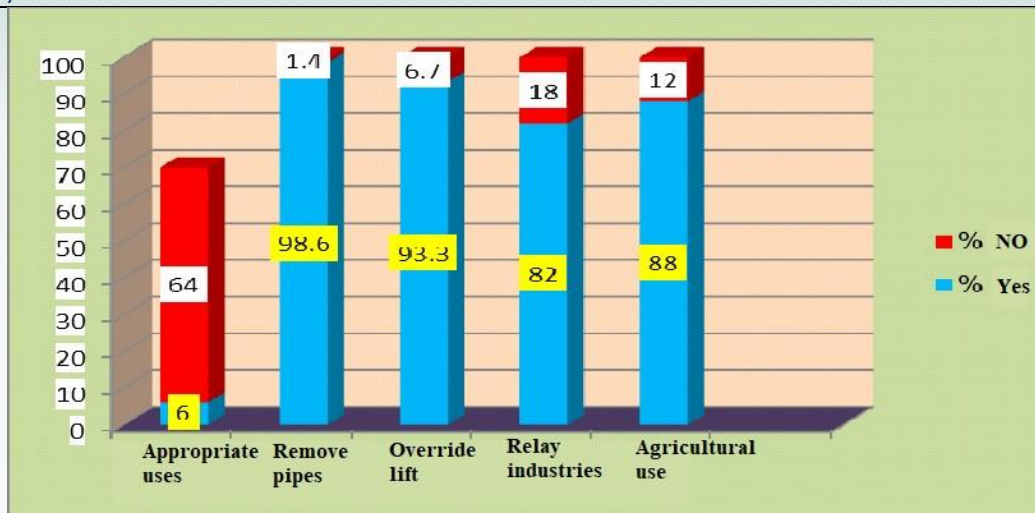


Figure 3. Show attribution of citizens' opinions of developing urban land use on the bank of the Euphrates River

It was found through Table (3) and Figure (3) that the majority of the opinions of the residents of the study area who assert that the current uses are inadequate was high by (94%), which caused the decline of green areas in a chaotic and ill-considered manner, which affected the aesthetic of the urban riverbank in the district. Habbaniyah, and this indicates the citizen's awareness of preserving the water of the Euphrates River and its banks with the intention of benefiting from it in the future, followed by a rise in the opinions of those who prefer removing sewage pipes from the Euphrates River, with a very high rate of (98.6%), because of its risks to human health. Therefore, an integrated network of wastewater must be established to preserve the river's water and its banks, and then make use of it for agricultural purposes after treatment, without discharging or throwing any waste that affects the quality of water according to Iraqi laws and legislations, as for those who wish to lift all kinds of bypassing The river sanctuary, whether residential, industrial or private, was also high by (93.3%), because the riverbank is owned by everyone and not the monopoly of a number of people, which indicates the desire of citizens to reach the river bank because it represents a source of entertainment and tourism A by itself, while the opinions of those wishing to migrate the industrial activities that cause pollution of the Euphrates River water and its banks by (82%), and to transfer it to several locations outside the tide, by establishing new industrial zones behind the Nazim Al-Dhban Bridge, east of Al-Khalidiya, in order to preserve the safety of the environment Habbaniyah district according to the protection laws, and finally the citizens' opinions were represented by a desire for recreational use on the river bank, at a high rate of (88), compared to agricultural use that came with the lowest rates (12), in the general study area for the rest of the uses, so the citizens' desire must be taken into account when starting In any planning process, that is to equip the land with the rules of public services, to make the priorities of recreational and tourism activities successful, to meet the needs of the region's residents and visitors§

- A. Establishing a cornice that includes a bicycle path, which is safe for pedestrians and represents an entrance for visitors and an important mode of transportation, as well as the health and leisure side, with a distance from the riverbank and paved with stones that protect it, to blend in with the seating areas and add aesthetic to the river, to give the enjoyment of rest, contemplation and social gatherings.
- B. Establishing public parks with open spaces containing a group of shade trees, fountains and flowerbeds, which are an essential element in purifying the air and absorbing noise, which make visitors feel the beautiful and delicate feeling when hiking, with the psychological comfort it provides, representing an opportunity to

establish cultural seasons and attract official festivals.

- C. Establishing various playgrounds based on their users to practice recreational sporting activity and hold competitions, most notably the stadiums and swimming pools, as well as places for walking and jogging, and these places are isolated from the families 'sitting to avoid the noise they make from them
- D. Establishing hotels, tourist houses, restaurants, kiosks, boat berths, and other such facilities that provide accommodation services with their facilities for tourists and hikers, thus increasing their interest in enjoying recreational medical attractions.
- E. Establishing a zoo that includes some different animals and birds, which large numbers of hikers wish to visit, to suit the spatial environment of its location.
- F. Providing toilets and laundries with garbage collection containers in sufficient numbers that are spread across the riverbank, being one of the important aspects for preserving recreational places.

## Conclusions

1. The overlap between the various uses of the land on the banks of the river, due to its violation of laws and legislations, as well as the weak monitoring of the municipality and the relevant institutions on the river's neighborhoods from parts of the city, which is what caused the encroachment on its banks and its monopoly on the part of the people.
2. The randomness in the distribution of land uses due to the lack of basic designs, caused by environmental problems that accumulated in the banks of the river, which greatly affected the pollution of the water of the Euphrates River, especially with the lack of maintenance of the river and the banks.
3. The citizen has a great desire to preserve and develop these sites, given that the riverfront is the natural recreational outlet, in the Habbaniyah district, which suffers from the actual shortage of recreational uses and services.

## Recommendations

1. Activating laws in implementing legislation to lift the excesses on the riverbank, to regulate the current uses of the land, in a manner consistent with activities that are compatible with the river, such as recreational and agricultural, to enhance the most important development process in the city to preserve it.
2. Activating the supervisory role to prevent the establishment of new projects contrary to the controls on the banks of the river, to preserve its safety from pollution and to transfer polluting activities for use, with an emphasis on the maintenance of rivers and their banks from the accumulation of these sediments along the river to provide a healthy environment suitable for the population.
3. The appropriation of lands belonging to citizens in the riverbank at attractive prices or compensation, by the government to reduce the phenomenon of trade in it, while investing in development projects that concern the interest in tourism and entertainment on the one hand and maintaining the stability of the banks on the other hand.

## References

- Abbas, A. R. (1977). *Geography of Cities*: Asaad Press.
- Abdullah, M., Al-Ansari, N., & Laue, J. (2019). Water Resources Projects in Iraq: Reservoirs in The Natural Depressions. *Journal of Earth Sciences and Geotechnical Engineering*, 9(4), 137-152.
- Adamo, N., Al-Ansari, N., & Sissakian, V. (2020). How dams can affect freshwater issues in the

- Euphrates-Tigris basins. *Journal of Earth Sciences and Geotechnical Engineering*, 10(1), 15-48.
- Al-Ansari, N., Ali, A., & Knutsson, S. (2014). Present conditions and future challenges of water resources problems in Iraq. *Journal of Water Resource and Protection*, 6(12), 1066-1098.
- Al-Hiti, S. F. (2010). *Geography of Cities. Mosul: Directorate of the Library and Publishing House: University of Mosul.*
- Al-Kaissi, S. M. (1984). *The influence of natural and cultural environment on the fabric of the city, with special reference to Iraq.* University of Sheffield.
- Al-Shabani, A. K. (2021). Director of the Environment Department in Anbar Governorate, 5.
- Al-Shujairi, K. H. (2021). An Employee of the Habbaniyah Department of Agriculture.
- Alwan, A. K. (2009). Attention to reducing visual pollution is an environmental necessity. 10.
- Bari, Z. (1977). Syrian-Iraqi dispute over the Euphrates waters. *International Studies*, 16(2), 227-244.
- Crist, R. E. (1960). Land for the Fellahin, X: Land Tenure and Land Use in the near East. *The American Journal of Economics and Sociology*, 19(2), 207-216.
- Davies, D. H. (1957). Observations on land use in Iraq. *Economic Geography*, 33(2), 122-134.
- Ghazal, N. K., Shaban, A. H., Mashi, F. K., & Raihan, A. M. (2012). Change Detection Study Of Al Razaza Lake Region Utilizing Remote Sensing And GIS Technique. *Iraqi Journal of Science*, 53(4), 950-957.
- Iraq, T8 R8 o8 (2626)8 the Directorate of Public Survey, the administrative map of Iraq' scale 1/110 km, and the map of the Anbar governorate, a scale of 1/50 km: the Ministry of Water Resources.
- Isaev, V., & Mikhailova, M. (2009). The hydrography, evolution, and hydrological regime of the mouth area of the Shatt al-Arab River. *Water resources*, 36(4), 380-395.
- Kibaroglu, A., & Scheumann, W. (2011). Euphrates-Tigris rivers system: Political rapprochement and transboundary water cooperation *Turkey's water policy* (pp. 277-299): Springer.
- Morozova, G. S. (2005). A review of Holocene avulsions of the Tigris and Euphrates rivers and possible effects on the evolution of civilizations in lower Mesopotamia. *Geoarchaeology*, 20(4), 401-423.
- Musa, A. H. (2006). Environmental Pollution. Damascus, Syria: Dar Al-Fik. 5.
- Odeh, A. (2021). *Head of the Town Planning Department in the Habbaniyah*
- Salman, M. (2005). The Euphrates and Tigris: south boundary utilization and views. *Water, Development and Cooperation—Comparative Perspective: Euphrates-Tigris and Southern Africa*, 136.
- Sulaiman, S. O., Kamel, A. H., Sayl, K. N., & Alfadhel, M. Y. (2019). Water resources management and sustainability over the Western desert of Iraq. *Environmental Earth Sciences*, 78(16), 1-15.
- Yaqoub, M. (1981). Water Pollution. In R. Colas. *Beirut: Awaidat Publications*, 13.