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LEGAL ANALYSIS OF RIVER POLLUTION CONTROL AND PREVENTION IN KURDISTAN IRAQ

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DOCTOR OF PHILOSOPHY
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LEGAL ANALYSIS OF RIVER POLLUTION CONTROL AND PREVENTION IN KURDISTAN IRAQ

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A thesis submitted to the Ghazali Shafie Graduate School of Government in fulfilment of the requirements for the Doctor of Philosophy.
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ABSTRACT

Rivers are the main source of potable water, as a human right, and have socio-economic value for the whole society. Among the main factors of river pollution are industrialization, population growth, and the effects of climate change. For instance, the Tanjero River in Kurdistan, Iraq, is seriously polluted due to a lack of legal framework and poor water management. Thus, the key objective of this study is to critically analyze the legal framework and water management in Kurdistan to curb the problem of river pollution. The study adopts doctrinal, socio-legal, and qualitative approaches to analyze the primary and secondary data. In the case of the Tanjero River, the main legal frameworks analyzed include Law No. 8 (2008) for Environmental Protection and Improvement, Law No. 3 (2010) for Environmental Protection and Improvement Board, and Law No. 4 (2022) for Water Management and Protection in the Kurdistan region of Iraq. This study found that, although the international legal instruments provided a general guideline on water protection and sustainable water management, enforcement is still lacking because of the absence of a binding international law concerning river protection. Moreover, in Kurdistan, the existing legal provisions on river protection are inadequate due to an incomprehensive legal framework, poor enforcement of protective legal mechanisms, institutional fragmentation, and poor coordination among governmental institutions. Thus, some of the provisions in Law No. 8 (2008) for Environmental Protection and Improvement, Law No. 3 (2010) for Environmental Protection and Improvement Board, and Law No. 4 (2022) for Water Management and Protection in the Kurdistan region of Iraq need to be amended to address the problem. An active integration system and good coordination between ministries in Kurdistan are crucial to sustainably establishing better water management. It is suggested that the power of the Environmental Board and Water Council (WCR) in Kurdistan be given to an independent body that will be able to tackle this problem more effectively. Also, better coordination between Hawler and Baghdad is necessary to face the current water challenges in the climate change era.

Keywords: River pollution; Tanjero River; Water Management; Sustainability and Law.

ABSTRAK

Sungai merupakan sumber utama air minuman, sebagai hak asasi manusia dan ia mempunyai nilai sosio-ekonomi untuk seluruh masyarakat. Antara faktor-faktor utama pencemaran sungai adalah perindustrian, pertumbuhan penduduk, serta kesan perubahan iklim. Sebagai contoh, Sungai Tanjero di Kurdistan, Iraq tercemar teruk pada masa kini kerana ketiadaan kerangka undang-undang serta pengurusan air yang lemah. Justeru, objektif utama kajian ini adalah untuk menganalisis secara kritis kerangka perundangan dan pengurusan air di Kurdistan bagi membendung masalah pencemaran sungai. Kajian ini menggunakan kaedah doktrin, sosio-perundangan dan pendekatan kualitatif dalam menganalisis data primer dan sekunder. Dalam kes Sungai Tanjero, kerangka undang-undang utama yang telah dianalisis termasuklah Undang-undang No. 8 (2008) untuk Perlindungan dan Penambahbaikan Alam Sekitar, Undang-undang No. 3 (2010) untuk Lembaga Perlindungan dan Penambahbaikan Alam Sekitar, dan Undang-undang No. 4 (2022) untuk Pengurusan dan Perlindungan Air di wilayah Kurdistan Iraq. Kajian ini mendapati, walaupun instrumen undang-undang antarabangsa menyediakan garis panduan umum mengenai perlindungan air dan pengurusan air mampan, penguatkuasaan masih kurang akibat ketiadaan undang-undang antarabangsa yang mengikat perkara-perkara yang berkaitan dengan perlindungan sungai. Selain itu, di Kurdistan, peruntukan undang-undang sedia ada mengenai perlindungan sungai adalah tidak mencukupi disebabkan oleh kerangka undang-undang yang tidak menyeluruh, penguatkuasaan yang lemah ke atas mekanisme perlindungan undang-undang, pemencilan institusi dan penyelarasan yang lemah di kalangan institusi kerajaan. Oleh itu, beberapa peruntukan dalam Undang-undang No. 8 (2008) untuk Perlindungan dan Penambahbaikan Alam Sekitar, Undang-undang No. 3 (2010) untuk Lembaga Perlindungan dan Pembaikan Alam Sekitar, dan Undang-undang No. 4 (2022) untuk Pengurusan dan Perlindungan Air dalam Wilayah Kurdistan Iraq perlu dipinda untuk menangani masalah tersebut. Sistem integrasi yang aktif dan penyelarasan yang baik antara kementerian di Kurdistan adalah penting untuk mewujudkan pengurusan air yang lebih baik secara mampan. Adalah dicadangkan supaya kuasa Lembaga Alam Sekitar dan Majlis Air di Kurdistan diberikan kepada suatu badan bebas yang mampu menangani masalah ini dengan lebih berkesan. Selain itu, penyelarasan yang lebih baik di antara Hawler dan Baghdad adalah perlu untuk menghadapi cabaran air semasa dalam era perubahan iklim.

Kata kunci: Pencemaran sungai; Sungai Tanjero; Pengurusan air; Kelestarian dan undang-undang.

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DEDICATION

I dedicate this work to my father and mother, who have always supported me in advancing my level of education. To my lovely wife Snoor, I really appreciate your love, support, company and ability to hold the family together when this task took most of my time and energy. Thank you so much for the endless sacrifices to enable me to accomplish this dream. This thesis is also dedicated to my brothers, sisters and my two children. I advise them to work hard to raise awareness among society to save the planet by protecting the environment and combating pollution.

Finally, this study is specially dedicated to the decision-makers in the Kurdistan region with the hopes that they will develop better water management policies and rules. Lastly, this work is also for all environmentalists who have sacrificed a lot to preserve natural resources.

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LIST OF ABBREVIATIONS

BCM	Billion cubic meters
DoOM	Directorate of Oil and Mining in Garmian Administration
EIA	Environmental Impact Assessment
EPIB	Environmental Protection and Improvement Board
EPIC	Environmental Protection and Improvement Council
EPID	Environmental Protection and Improvement Directorate
FAO	Food and Agriculture Organization of the United Nations
ISWM	Integrated solid waste management
IWRM	Integrated water resources management
KRG	Kurdistan Region Government
KRI	Kurdistan Region of Iraq
MDGs	Millennium Development Goals
MENA	Middle East and North Africa
MoAWR	Agriculture and Water Resources
MoH	Ministry of Health
MoMT	Ministry of Municipalities and Tourism
MoNR	Ministry of Natural Resources
MoTI	Ministry of Trade and Industry
MoWR	Iraqi Ministry of Water Resources
MSW	Municipal solid waste
NAP	National Adaptation Plan
NGO	Non-Governmental organization
PUB	Public Utilities Board
SDGs	Sustainable Development Goals
UN	United Nations
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Program
UNGA	United Nations General Assembly
UNPE	United Nations Program of Environment
WB	World Bank

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WEC World Energy Council

WEF World Economic Forum

WCR Water Council in the Region

WFD Water Framework Directive

WHO World Health Organization

WSSD World Summit on Sustainable Development

WWF World Wide Fund for Nature

OECD Organization for Economic Cooperation and Development for Europe

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Water is essential for human survival and plays a crucial role in all systems, including sanitation, healthcare, education and manufacturing.[1] One of the main sources of water is the river. River pollution is increasingly becoming a global issue including in Kurdistan. In Latin America, Africa and Asia, for example, contamination with high levels of pathogenic has been found in one-third of their rivers. River pollution may cause risk to human health, affecting the utilization of river water for human needs such as drinking, irrigation, and manufacturing. According to the United Nations Environment Programme (UNEP) report (2020), one-seventh of all rivers contain high organic pollution, while severe to moderate salinity is found in one-tenth of the rivers.[2]

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More than 80 percent of wastewater is still being discharged into rivers directly without any treatment.[3] The failure of waste water management has contaminated the rivers and may cause diseases and health risks to humans. The 2020 report by the World Health Organization (WHO) indicated that 58 percent of diarrheal illnesses

[1] "Water and Climate Change: What do We Mean?" UNWATER, accessed February 10, 2020, https://www.worldwaterday.org/2020-home/learn/.
[2] "Towards a Pollution-Free Planet Background Report", UNEP, accessed June 4, 2020, http://wedocs.unep.org/bitstream/handle/20.500.11822/21800/UNEA_towardspollution_long version_Web.pdf?sequence=1&isAllowed=y.
[3] Ibid.

resulted from lack of clean water and sanitation[4] due to the failure of waste water management.[5]

Kurdistan is the land of the Kurds and is a part of Iraq.[6] The territory of Kurdistan is divided into four parts. Each part is linked to their respective neighboring countries namely Turkey, Iraq, Syria, and Iran.[7] Based on the latest data published by the region's statistics office in 2021, the population of the Kurdistan region is estimated at 6.2 million as at 2020.[8] There are five main rivers in Kurdistan namely the Khapoor, Great Zab, Little Zab, Awaspee, and Serwan rivers. These rivers, which run across the Kurdistan region, are rich in springs, groundwater, and rainwater. About 60 percent of the water that flows in Kurdistan is sourced within the region, while the remaining is from neighboring countries.[9] The region is located in the upstream of all of Iraq's international rivers.[10] Thus, Kurdistan is situated in the best part of Iraq, with water resources from a heavier rain distribution[11] compared to the other areas in Iraq.

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[4] Polluted water sparks health risks because it can transmit serious diseases such diarrhea, cholera, dysentery, typhoid, and polio. It is estimated that polluted water has led to 485,000 diarrhea-related deaths annually. See "Drinking water", World Health Organization, accessed June 17, 2020, https://www.who.int/newsroom/factsheets/detail/drinkingwater#:~:text=Contaminated%20water%20and%20poor%20sanitation,individuals%20to%20preventable%20health%20risks.

[5] "Towards a Pollution -Free Planet Background Report", UNEP.

[6] Iraq is located in southwest Asia and northeast of the Arab world and lies between latitudes 29 and 37 and longitudes 38° and 48° (Figure 1.1). Iraq has a total area of 438,317 km2, with a total water body area of 950 km2. The Iraqi population for 2023 was estimated at 43 million people. See: Ministry of Planing, accessed Septemebr 18, 2021. https://mop.gov.iq/news/view/details?id=508;Ala H Elaiwi, Karima Hasan, and Mufid Al-hadithi, "Management of Natural Iraqi Water Resources, Aims And Challenges", in *3rd International Conference on Sustainable Engineering Techniques (ICSET 2020)*: https://doi.org/10.1088/1757-899X/881/1/012181.

[7] Ala J. Mohammed, "*The politics of Iraqi Kurdistan: Towards Fedralism or Secession?"* (PhD diss., University of Canberra, Australia, 2013), 96.

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[10] Ministry of Planning in Kurdistan Region and United Nations Development Programme (UNDP), *Building the Kurdistan Region of Iraq: The Socio-Economic Infrastructure*. (Hawler, 2012): 34, http://www.mop.gov.krd/resources/MoP Files/Newsletter/SEINA-FINAL.pdf.

[11] According to the annual average rainfall, the Region is classified into three parts: assured rainfall (over 500 mm), semi-assured rainfall (350-500mm), and unassured rainfall (less than 350 mm). See:

The Tanjero River is located about 7 km southwest of Sulaymaniyah city (Figure 1.1). The river originates from the Piramagroon mountain in the northwest of the city. Chaq-Chaq is the main sessional stream that feeds the Tanjero River, which then merges with the Sarchinar stream and converges with the Qiliasan stream near the Qiliasan village, flowing down to some other small tributaries and springs to form the Tanjero River in the southwest of the city.[12] The Tanjero River stretches for 70 km to merge with the Zalim Stream and another 30 km to converge with the Serwan River which originates from Iran. The Serwan-Tanjero junction makes up the artificial lake named "Darbandikhan lake", reaching the Darbandikhan dam. The overall river stretches from the Chaq Chaq Stream to the Darbandikhan Dam for about 130 km.[13] The river stretches from the northwest to the southeast of Sulaymaniyah city between (35° 35' 01") and (35° 28'44") North and (45° 21' 39") and (45° 26' 17") East. It is located at 656-787 m above sea level[14] and ends at the Darbandikhan Lake.[15] While the Darbandikhan Lake is located about 60 km southeast of Sulaymaniyah city and 230

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KRG, Ministry of Planning, *Regional Development Strategy for Kurdistan Region Report 2012-2016*". (Erbil, 2012),6, http://www.mop.gov.krd/resources/MoP Files/PDFFiles/gd_ps/regional_development_strategy.pdf.

[12] Nizar Y. Hama-Salh , Nigar A. Aziz, and Sabah M. Salih, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastwater and Industrial Wastewater in Sulaimani District," *Journal of Kirkuk University –Scientific Studies*, vol.7,no.1, (2012): 67.

[13] Water Keepers Iraq in collaboration with the Humat Dijlah Organization and the Kurdistan Environmental Protection and Improvement Board (Environment Directory of Sulaimaniah), Tanjero River Threat Assessment Survey and Outreach Project; Tanjero River Threat Assessment & Action Plan (TAAP) Report (Sulaymaniyah: Waterkeepers Iraq, June 2022), November 19, 2022, https://www.waterkeepersiraq.org/uploads/9/2/7/0/9270858/tanjaro_river_threat_assessment_14_8_2022.pdf

[14] Omed Muhammad Mustafa, "Impact of Sewage Wastewater on the Environment of Tanjero River and Its Basin within Sulaimani City/NE-Iraq" (Master thesis, University of Baghdad, 2006), https://www.academia.edu/2078630/Mustafa_O_M_2007_Impact_of_Sewage_Wastewater_on_The_Environment_of_Tanjero_River_and_Its_Basin_Within_Sulaimani_City_NE_Iraq_M_Sc_Thesis_University_of_Baghdad_College_of_Science_P_206

[15] The Darbandikhan dam is 59 years old in 2020 with a 120 km2 basin. It can store 3 BCM (Billion Cubic Meter) and can generate 37000 Kw/h hydroelectricity. It originates from the Serwan and Tanjero Rivers. Its length is 535 m with a height of 128 m. The Darbandikhan dam is chiefly used to produce hydroelectricity and for irrigation purposes. See: Khasraw Abdulla Rashid, "Environmental Implications of Tanjero Waste Disposal Site in the City of Sulaimani", (Ph.D. thesis, University of Sulaimani, 2010).

km northeast of Baghdad. The Diyala River rises from Darbandikhan Lake and is considered one of the significant tributaries of the Tigris River in Iraq.[16]

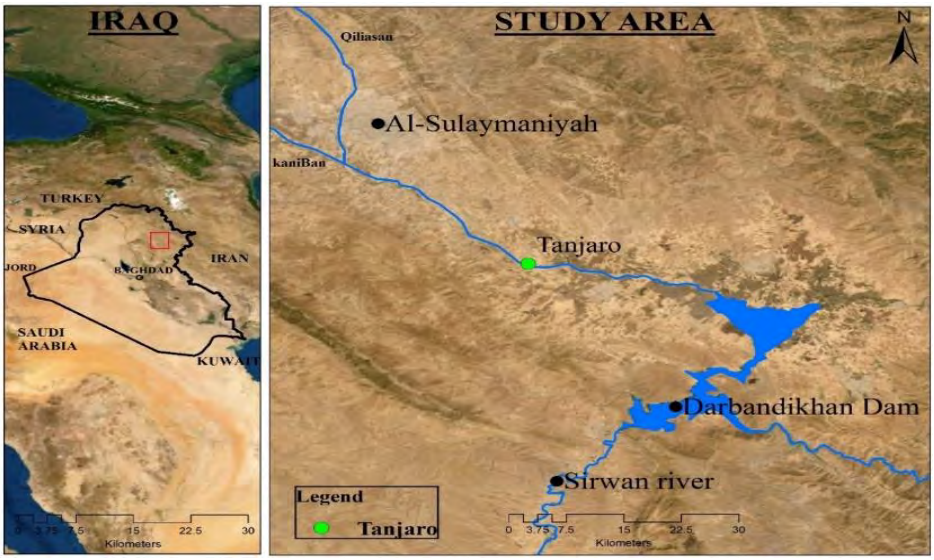

Figure 1. 1 Location of the Tanjero River
Source: (Arc GIS 10.3 Software)[17]

Tanjero valley is a location for residential, agricultural, and industrial activities. The wastewater from the sewerage system of Sulaymaniyah City is discharged directly into the Tanjero River without any treatment.[18] As a result, the Tanjero River has been transformed from a beneficial natural water resource for irrigation and other human purposes into a polluted river that causes risks to public health due to the pollution on the ground and other surface water, such as Darbandikhan Lake and Serwan River.[19]

The current main legal framework on environmental law in Kurdistan are governed by Law No. 8 (2008) for Environment Protection and Improvement in Kurdistan Region

[16] Salih N. Majid, Ahmed I. Khwakaram, and Chalang S. H. Gado, "Pollution Status Evaluation of Some Heavy Metals along Some Surface Water Sources by Multivariate Data Analysis at Sulaimani Governorate", *Journal of Zankoy Sulaimani - Part A* 20, No. 1 (2018): 63–80, https://doi.org/10.17656/jzs.10642.
[17] Arc GIS 10.3 Software, the data accessed November 20, 2019 from: https://www.diva-gis.org/Data, and https://www.arcgis.com/index.html#.
[18] Salwan S Al-hasnawi, "Water Quality Index Of Tanjero River Basin Near Sulaymania City", *Al-Mustansiriyah J. Sci.* 23, No. 8 (2012): 193–200.
[19] Othman, "Environmental Health Assessment in Sulaymaniyah City and Vicinity", 2017.

of Iraq and Law No. 3 (2010) Environment Protection and Improvement Board in Kurdistan Region of Iraq. These two important laws play a very important role with regards to environmental issues in Kurdistan including that of the rivers. Even though Kurdistan has a legal framework, the problem of river pollution remains at a critical stage and requires fast action by all stakeholders. This is to ensure that all the citizens in Kurdistan have access to clean water from the river.

1.2 Problem Statement

The accessibility of clean water and sanitation[20] has become one of the most important goals under the 2030 Sustainable Development Goals (SDGs) agenda. Water-related ecosystems addressed in SDG 6 include wetlands, rivers, aquifers, and lakes, which sustain a high level of biodiversity life. The right to access clean water was officially recognized by the United Nations General Assembly (UNGA) based on the UNGA resolution 64/92 on July 28, 2010, and became one of the essential human rights.[21]

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The water quality of a river is important for many reasons, but the most obvious one is that water sustains all life. Due to a variety of pollutants detected including industrial

[20] Fuller et al., "Pollution and health: a progress update," *Lancet Planet Health,* Vol 6 (June 2022): e535–47, https://doi.org/10.1016/ S2542-5196(22)00090-0

[21] "Human Rights to Water and Sanitation", United Nations, accessed October 30, 2022, https://documents-dds-ny.un.org/doc/UNDOC/GEN/N09/479/35/PDF/N0947935.pdf?OpenElement

waste, agricultural runoff and urban litter, the Tanjero River in Kurdistan has been transformed into one of the most polluted rivers in Iraq[22] (see Figure 1.2 below).

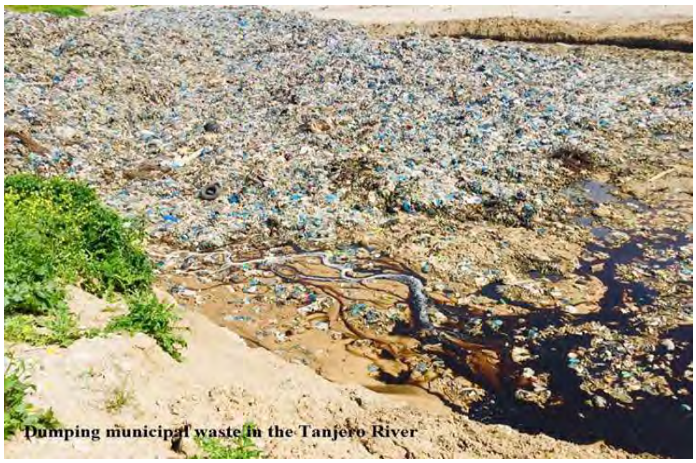

Figure 1.2 Dumping of municipal waste near the Tanjero River
Source: (Atta, 2019)[23]

Solid and water wastes are caused by residues as well as industrial, oil, municipal, sewer, medical, and agricultural wastes. These various wastes are disposed directly onto the land along the river, with an area of approximately 230 square km, in separate pits with a depth of 10 meters.[24] The government of Kurdistan made an incentive in 2018 by building a treatment factory to combat this problem. The treatment factory known as the Mechanical Biological Treatment (MBT) was built near the Tanjero River to curb pollution. However, the objective of this plan was not successfully achieved since the function of the MBT is limited. Specifically, the MBT does not have the capacity to recycle all types of solid wastes, such as medical wastes, construction

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[22] Othman, "Environmental Health Assessment in Sulaymaniyah City and Vicinity," no. May (2017), https://doi.org/10.13140/RG.2.2.12898.12483; Al-hasnawi, "Water Quality Index Of Tanjero River Basin Near Sulaymania City," *Al- Mustansiriyah J. Sci.* 23, no. 8 (2012): 193–200; Nizar Y. , Hama-Salh, Nigar A. Aziz, and Sabah M. Salih, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District," *Kirkuk University Journal-Scientific Studies* 1, no.1(2012), 67-85. 10.32894/kujss.2012.44614; Omed M Mustafa and Hiwa S Ahmad, "Nitrate Pollution in Groundwater of Sulaimaniyah City , Kurdistan Region , Ne Iraq" 4, no. 2 (2008): 73–82.

[23] Ranj Atta (Management of Sulimani Branch of the Kurdistan Nature Organization-KNO), Dumping municipal waste near the Tanjero River, Sulaymanyah, photo accessed November 3, 2019.

[24] Sherin Ahmed, "pollution threat thousands of Sulaimnyiha resedent's live – no solution till now" (*Radio Nawa*), May 23, 2019, https://www.radionawa.com/all-detail.aspx?jimare=12322.

wastes, and others.[25] As a result, the Tanjero River remain seriously contaminated. This scenario gave a grave socio-economic impact not only to the people in Kurdistan, but also to all kinds of aquatic life.

Since the problem of the Tanjero River remains unsolved, the Serwan river is also indirectly affected through the Darbandikhan Lake (see Figure 1.1). In 2022, a total of 245 imminent threats have been reported within the river basin or next to it. This problem indirectly poses risks to other rivers in Kurdistan, making the river water unpotable, non-swimmable, and unfishable.[26]

The legal framework protection for rivers is governed by Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq. These are basically the main laws related to water. Since the problem of polluted river remains unchanged, these laws have failed in combatting pollution particularly for the Tanjero River. This can be seen from the total number of reported environmental cases from five governorates which were brought to the courts in Kurdistan in 2020, i.e., 655 cases. Even though the total number of cases dropped to 414 in 2021, the total number of cases in Sulaymaniyah has been increasing from 125 to 356 cases[27] as shown in Table 1.1.

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[25] Twana Jafer, "Legal Ranj Program", (*Rudaw* Tv.), accessed March 22, 2021 Monday, https://www.rudaw.net/sorani/onair/tv/episodes/episode/lagal-ranj-22032021.
[26] The assessment was conducted over two months (from April to June 2022), surveying the river from its sources to the converging point with the Serwan river. The survey was carried out by 2 field workers using cars, boat and drone to identify threats. The survey depended on some criteria taken form BirdLife International (2006) for evaluating conservation area threats.
[27] Environmental Protection and Improvement Board. Annual Report of 2021.

Table 1. 1

Number of environmental cases in the region for 2020 and 2021

No.	Governorate	Number of cases in court in 2020	Cases in 2021
1.	Hawler	429	48
2.	Sulaymaniyah	125	356
3.	Dohok	43	0
4.	Garmian	2	8
5.	Rapareen	56	2
	Total	655	414

Source: (Board Annual Report of 2020 and 2021)[28]

Apart from the laws, the problem of enforcement due to its complexity and involvement of too many institutions is also crucial in Kurdistan.[29] The involvement of various institutions creates uncertainty and lacks corporative effect to efficiently curb the issue of polluted rivers.[30] For example, more than 100 illegal oil projects were reported in 2016 which caused serious pollution to the rivers particularly in Kurdistan.[31] In 2023, six oil refineries have been identified nearby the Tanjero River and Arbat area which threaten the river's water quality and its surrounding environment; due to the lack of treatment plants for their generated wastes and pollutants, serious pollution has occurred affecting the air, soil, surface water, and groundwater.[32] Based on the above report, it is clear that polluted rivers in Kurdistan require urgent action and attention through its legal framework and enforcement.

[28] Environmental Protection and Improvement Board, Annual Report of 2020 and 2021.
[29] Respondents 1, and 3.
[30] Respondents 4,5 and 10.
[31] Aziz, Hama-Salah,and M. Salih, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District", 71.
[32] Roundtable Report on "The Impact of Oil Refineries on the Environment in Arbat Area", Environmental Journalism in Iraq Project, Partners: Waterkeepers Iraq Organization, Internews, Nirij Network, Sama Al-Ebtikar Foundation, Published on September 19,2023, accessed on November 27, 2023, https://www.facebook.com/WaterkeepersIraqKurdistan/posts/pfbid0vDHLYMJ8h7Lu2Xhu94WVnK67kduQRP8oMv7foNLG86nmCWt6roA4uXiGhtaZ15Ljl?_rdc=1&_rdr

1.2.1 The Problem of Existing Legal Framework for River Protection in Kurdistan

Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq consists of three articles on water protection, as follows:

Article 22: "*The exertion and discharging of any harmful substances, liquid, gaseous, radioactive or thermal into water sources or their streams are prohibited if they are not treated according to usual standards*."

Article 23: "*Determination of regional standards for surface, ground and drinking water will be set by regulation."*

Article 24: *"The Ministry determines the measurement for the pollution level that is permissible in water used for drinking, irrigation, industrial, and services, with returning to this measurement when needed."*

It is crystal clear that these three articles deal with the protection of water as a whole in Kurdistan. However, the scope of the provisions remains unclear for some reasons since the pollution of the Tanjero River is still in the red zone and remains unsolved.[33] For example, the meaning and scope of "usual standards", "the drinking water standard", and "specific measurement" are missing and not clear enough for the purpose of alleviating river pollution as set by the regulator.[34] Due to some unclear terms in the above provision, the relevant ministries/agencies in Kurdistan find it difficult to overcome the issue of river pollution.

In addition, Law No.8 (2008) also includes some legal tools and technics to prevent and control river pollution) such as prohibition, obligation, licensing, reporting, and enticements, along with administrative sanctions (such as financial and non-financial

[33] Respondent 1, Assoc. Prof, Salahaddin University, College of Law, date of interview 8 February 2021.
[34] Respondent 1.

penalties under Articles 41, 42, and 43). However, these legal tools and technics are deem to be inefficient and insufficient to curb the current status in Tanjero.

The second important law pertaining to water is Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.[35] This law was passed in June 2, 2022 known as the "New Water Law" which consists of 24 articles including river protection, legal mechanisms to prevent and control water pollution, such as preventing direct discharge of various wastes into rivers from different sectors including industrial, agricultural, housing, health, and weapons, except based on scientific standards after proper treatment. The New Water Law also governs tools and techniques for the protection of surface and underground water resources, such as monitoring system, licensing, coordination with different institutions, and funds and financial budget.[36] However, this new law still has hiccupped in some aspect particularly in combating the river pollution in Kurdistan.

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For example, in Article 11,[37] the law made a condition for new projects to have a treatment unit as a requirement for a license. They are given 6 months from the date of its enforcement to build a treatment plant. Failure to comply will cause the withdrawal of their license.[38] But the provision lacks clarification on the timeframe as well as the procedure of revocation of the license. The New Water Law also lacks the provision for dealing with existing illegal projects currently causing pollution to the river[39] as well as the server punishment and penalties for offences related to the

[35] Wakayae Kurdistan, No. 284, July 7, 2022, Vol.:22, P.1-9.
[36] See Articles such as Article 9, 10,11,12,13,14, 15,16 and 17.
[37] Para 4.
[38] Para 5, Article 11.
[39] Article 11 and other articles not include any provisions to deal with the illegal projects that causing river pollution.

violation of water sources.[40] Thus, further action is needed to serve as a great lesson for all players in Kurdistan for the purpose of river cleaning and treatment.[41]

1.2.2 The Problem of Institutional Arrangement for River Protection

The Environmental Protection and Improvement Board (EPIB) was established in the Kurdistan Region in accordance with Law No. 3 (2010) of the EPIB. Its main objective is to maintain and enhance Kurdistan's environment and to prevent pollution or other activities that are dangerous to the ecosystem and human health.[42] It should be noted that the Board is affiliated with some ministries.[43] Based on Article 7, the Council of the Board is made up of representatives of ministries such as the Ministry of Agricultural and Water Resources (MoAWR), Ministry of Health (MoH), Ministry of Municipalities and Tourism (MoMT), Ministry of Natural Resources (MoNR), and Ministry of Industry and Trade (MoIT).[44] Moreover, all the regional governorates have their respective environmental protection and improvement committees established under the purview of the governor.[45]

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The New Water Law has established a new council for water management and protection in the region called the Water Council in the Region (WCR).[46] It is clear from the law that the new water council is not an independent water agency since it is

[40] Article 19 and 20.
[41] Respondent 10.
[42] Article 3, Law No. 3 (2010).
[43] See Chapter four of the study.
[44] Article 2, Law No. 10 (2010) of the Ministry of Trade and Industry in Kurdistan Region of Iraq.
[45] Article No. 8, Law No. 3 (2010).
[46] Para 1, Article 7, "A council shall be formed in the Ministry called (the Water Council in the Region), headed by the Minister and the membership of each of the following:1. Undersecretary for Financial Resources Affairs 2. Chairman of the Environmental Protection and Improvement Authority in the region. 3.Director General of Water and Sewage in the Ministry of Municipalities and Tourism in the region. 4.Director General of Water Resources at the Ministry. 5.Director General of Dams and Water Reservoirs in the Ministry. 6.Director General of Research in the Ministry. 7.Director General of Horticulture, Pastures and Forestry in the Ministry. Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq."

located at the heart of the Ministry of Agriculture and Water Resources (MAWR). Based on Article 7, the council has 7 members from the MoAWR.[47] It has two members from other institutions namely the MoMT and the EPI Board, which have the right to vote. Another four general managers participate in the council's meeting as representatives of their ministries namely the Ministry of Planning(MoP), the Ministry of Electricity (MoE), the Ministry of Interior (MoI), and the Ministry of Health (MoH).[48] Meanwhile, these four representatives do not have the right to vote, as they indirectly relate to water management and protection.[49] However, the water council does not include members from the MoTI as an institution strongly connected to water pollution. Thus, the combination of appointed members is unbalanced and may cause poor coordination and law enforcement as a result of mixed responsibilities and roles.

Based on Paragraph 6, Article 7 of the New Water Law, the necessary recommendations and suggestions should be sent by the Minister to the Council of Ministries. This provision does not authorize the council to decide about the water policy. Furthermore, the New Water Law assigns a critical role to the water council regarding water management and protection.[50] Therefore, the multidisciplinary aspects of water require the provision of a clear mechanism to build effective coordination with other ministries, in particular for river pollution prevention.

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[47] Para 1, Article 7, Law No. 4 (2022).
[48] Para 2, Article 7.
[49] Para 1, 2 and 3, Article 7.
[50] According to the Article 8 of the new water law, the council has significant responsibility for nine different tasks, including creating internal water policy for the region, approving water usage planning by all sectors, deciding about water resources projects, deciding about water investment planning, determining the national strategy for climate and its impacts on water resources, and combating drought, floods, and water resources pollution in coordination with other relevant institutions. See; Article 8, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.

1.2.3 Coordination between the Institutions/Ministries

Even though the Environmental Protection and Improvement Board (EPIB) is the main institution responsible for curbing the issue of polluted water in Kurdistan, other institutions are also indirectly involved in this problem. The Board has a legal status as well as financial and administrative independence. In addition, this Board is associated with the President of the Council of Ministers to manage its administrative tasks.[51] Among the institution are MoAWR,[52] MoMT,[53] MoNR,[54] MoIT,[55] MoH,[56] and WCR. The scope and jurisdiction of each ministry have caused poor coordination between the institutions.[57]

For example, the MoAWR encountered difficulties in overseeing water resources for agricultural purposes, ensuring proper usage of agricultural waste and adequate water storage capacity, regulating water usage with significant minimization of water wastage in the agricultural and industrial sectors and normal households, as well as in providing training for farmers.[58] Furthermore, the Ministry is also faced with difficulties in conducting scientific research in the agricultural fields, which is further aggravated by the inadequate participation by the private sector and the government in developing the agricultural sector.[59]

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[51] Article 2, Law No. 3 (2010).
[52] The Law No. 6 (2010) and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[53] Kurdistan Parliament, Law No. 12 (2010) on the Ministry of Municipalities and Tourism of the Kurdistan Region – Iraq, accessed January 11, 2020, https://www.parliament.krd/english/parliament-activities/legislation/.
[54] MoNR used from here forward to replace the Ministry of Natural Resources.
[55] Article 2, Law No. 10 (2010) of the Ministry of Trade and Industry in Kurdistan Region of Iraq.
[56] MoH used from here forward to replace the Ministry of Health.
[57] See Chapter Four.
[58] Respondents 2,3, and 10.
[59] Ministry of Planning, "Regional Development Strategy for Kurdistan Region Report 2012-2016" (Erbil, 2012), http://www.mop.gov.krd/resources/MoP Files/PDF Files/gd_ps/regional_development_strategy.pdf.

1.2.4 Enforcement Mechanism for River Protection

The EPI Board, as the main administrative institution, is mandated to protect and improve the environment according to Law No. 3 (2010). The problems faced by the Board in its enforcement of environmental laws and regulations lie in the sources of pollution.[60] At the same time, other governmental agencies mandated to implement the environmental law and regulations have also encountered hurdles in the enforcement of environmental legislation in their respective fields. For instance, the MoAWR is tasked with enhancing human resources to rationalize the utilization of water resources, especially among farmers, through awareness and the provision of advanced technologies to develop the agricultural sector in the region.[61] The EPI Board is responsible for monitoring these industries by issuing environmental regulations or guidelines to ensure safety and to minimize the destruction of the ecosystem via the Environmental Impact Assessment (EIA) with regular monitoring in accordance with international conventions, treaties, and domestic laws.[62]

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Another important institution is the MoNR which is responsible for the shortcomings in environmental regulations enforcement, especially in the oil and gas field. In Kurdistan, river pollution is also caused by oil projects as can be seen with the Tanjero River[63] and the Great Zab River. These two rivers are contaminated with wastes from oil projects in the surrounding areas.[64] Thus, adequate environmental law and regulations are required along with efficient enforcement and a regular monitoring

[60] Tinti, "Water Resources Management in the Kurdistan Region of Iraq,", 3.
[61] Para 14, Article 2, Law No. 6, 2010 of the Ministry of Agriculture and Water Resources in Kurdistan Region of Iraq.
[62] Para 3, Article 4 and Article 16, Law No. 8 (2008) Environmental Protection and Improvement in Kurdistan Region of Iraq.
[63] Aziz, Hama-Salah,and M. Salih, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District", 71.
[64] Roundtable report on "The Impact of Oil Refineries on the Environment in Arbat Area".

system[65] from time to time by the responsible institutions including the EPIB, WCR, MoNR, and MoTI.

Based on Article 2 (Paragraph 5) of Law No. 15 (2007), the MoH is required to coordinate with the EPIB in environmental protection and improvement initiatives to prevent pollution in the region.[66] Furthermore, the MoH is also facing difficulties in properly preserving the environment and protecting the people from the hazards arising from river pollution such as that of the Tanjero River. It was reported that pollution can cause diseases such as cancer or allergies, either directly through contact with the contaminated surface water and groundwater or indirectly by consuming vegetables produced using polluted water from rivers such as the Tanjero River.[67]

Based on the above highlighted problems, the unsolved problem of river pollution in Kurdistan is caused by the currently insufficient legal framework and poor enforcement and coordination between the relevant institutions/ministries. The problem has been addressed by analyzing the current legal framework as well as institutional and enforcement mechanisms for curbing the problem of river pollution in the region, particularly the Tanjero River.

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1.3 Research Questions

Based on the problem statement, the research questions are as follows:

[65] Hallo Askari, Head of Kurdistan Environmental Protection and Improvement Board, accessed March 15, 2020, https://boe.gov.krd/blog/2020/01/26/.
[66] Para 6, article 2, Law No. 15 (2007) for the Ministry of Health in Kurdistan Region of Iraq.
[67] Othman, *Environmental Health Assessment in Sulaymaniyah City and Vicinity*, 2017; Al-hasnawi, "Water Quality Index Of Tanjero River Basin Near Sulaymania City", *Al- Mustansiriyah J. Sci.* 23, No. 8 (2012): 193–200.

1. What is the existing legal framework providing protection against river pollution in Kurdistan?
2. How does the institutional framework in Kurdistan deal with the issue of river pollution?
3. How does the enforcement mechanism for protecting against river pollution in Kurdistan overcome the problem of river pollution in Kurdistan?
4. How to improve river pollution control and prevention in Kurdistan, Iraq?

1.4 Research Objectives

The general objective of the study is to analyze the existing laws and legal framework on river protection in Kurdistan, especially to identify the legal lacunae therein by evaluating the adequacy and efficiency of the existing environmental laws in the prevention of river pollution with particular focus on the Tanjero River. To achieve the general objective, the following specific objectives have been formulated, which are:

1. To study the existing legal framework and protection against river pollution in Kurdistan?
2. To examine the institutional framework to overcome the issue of river pollution in Kurdistan?
3. To analyze the enforcement mechanism for the protection against river pollution in Kurdistan?
4. To recommend improvements to the existing legal framework for the control and prevention of the river's pollution in Kurdistan.

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1.5 Significance of the Study

The outcome of the proposed study based on the quintuple helix may benefit government, industry, society, academia and the environment. The study may assist stakeholders as a guidance to policymakers in enhancing the environmental legal system, highlighting the industries' legal responsibility towards sustainability through better performance and respecting the natural resources and the whole environment. However, the study may contribute to developing awareness by individuals in society. On the other hand, the study may be beneficial for accessing further knowledge on the topic for academics and researchers in the legal field and, which would have an affirmative impact on society through the maintenance of our ecosystem. Finally, the study also may be critical for the environment particularly for rivers. These benefits are discussed below:

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(a) Significant to the stakeholder

The findings from this study may be beneficial for stakeholders. The study may assist policymakers, including the Kurdistan Parliament as the Legislative and Executive authority (KRG). Therefore, this study is able to assist the Parliament in amending the existing environmental laws and developing the legal protection of water resources, particularly rivers in Kurdistan. The study may also shed some light on the lacunae and weaknesses in current water governance policies, especially those that deal with establishing efficient water management to prevent river contamination and achieve sustainable river management.

Moreover, the study is also significant for the industry as a main contributor to environmental degradation, including river pollution. This is because the study

discusses the impacts of industrial activities on water pollution and their legal responsibility for mitigating and controlling waste in a sustainable manner.

Nevertheless, this study definitely has long-term advantages in the realm of social well-being. It has a crucial role in serving the present society and its future generations in various ways ranging from rising awareness, enabling clean water access as a basic human right, improving healthcare by preventing waterborne diseases, providing a sustainable economic and agricultural system, preserving aquatic life, and protecting the treasured biodiversity. The study undoubtedly contributes to the effort of overcoming existing challenges towards achieving the SDGs by 2030, particularly Goal 6, which is focused on access to clean water and sanitation, which in turn is strongly interrelated with the other SDG goals and targets.

(b) Significant to the field of study

This study also will be beneficial for academicians in Kurdistan in different ways, including in methodology. This is because most previous studies in this field had adopted a scientific approach. Thus, this study is novel as it adopts a qualitative socio-legal method combined with the doctrinal method through semi-structured interviews., Further, the area of the study, namely the statutory protection of the rivers such as Tanjero River from pollution, will be different from previous studies mostly focused on the scientific perspective.

This study will be the best tool to acquire, develop or enhance knowledge and to facilitate researches in environmental laws in Kurdistan. The study will provide a pathway to the minds of scholars and future researchers by compiling specific issues

from various perspectives that have not been identified or discussed previously. Apart from that, this study also goes beyond one's personal experience and collects evidence on the basis of facts and rationality on river pollution, which will open the gates for further discourse and discussions in the future.

Thus, the data and findings gained from this study will be able to scientifically contribute to the existing literature. It may serve as a reliable reference for researchers and scholars specializing in the field of environmental laws and river protection. Eventually, the study is vitally importance for the ecosystem by providing a better legal framework for river protection from manmade wastes.

1.6 Research Methodology

Research methodology is an important course in every research to satisfy the research plan and the target devised by the researcher. Here, the details and description of the research methods, approaches and designs are highlighted for the purpose of the study. As the framework of the study, research methodology is associated with a particular set of paradigmatic assumptions that a researcher will use to conduct his research. There are two criteria that a research methodology needs to fulfill. Firstly, the methodology should be the most pertinent to achieve the research objectives. Secondly, it should be able to replicate the methodology used in other researches of the same nature.[68] Thus, the research methodology section of this study will cover the discussion on the design of the study, scope, types of data, data collection and data analysis.

[68] Glatthorn, Allan A., and Randy L. Joyner. *Writing the winning thesis or dissertation: A step-by-step guide*. Corwin Press, 2005.

1.6.1 Design of the Study

The design of this study is intended to provide an appropriate framework for the study to be conducted. It involves a process that the research has to conform to since it determines how the relevant information can be obtained. The research design has a critical impact on the reliability of the results obtained and stands for advance planning of the methods to be adopted for collecting the relevant data as well as the techniques to be used in the analysis. As a framework or blueprint for conducting the research activity, the research design contains details of the necessary procedures for obtaining the information needed to achieve the objective of the study. For this study, the doctrinal legal method and socio-legal method using the qualitative approach are adopted.

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(1) Doctrinal legal research

The word 'doctrine' originates from the Latin noun '*doctrina*', which means instruction, knowledge or learning. A doctrine comprises legal concepts and principles of all types of cases, statutes and rules and can be defined as "[a] synthesis of a variety of rules, principles, norms, interpretive guidelines and values".[69] The doctrinal legal research is extremely pertinent to the doctrine of precedent.[70]

In addition, doctrinal legal research (also called theory-testing or knowledge-building research) is an analytical study of legal texts from authorities such as conventional legal theories, laws, statutory materials, and court decisions, inter alia on specific legal issues. Doctrinal legal research jurisprudentially relies on the positivism approach of

[69] Terry Hutchinson and Nigel Duncan, "Defining and Describing What We Do: Doctrinal Legal Research", *Deakin Law Review* 17, No. 1 (2012): 83, https://doi.org/10.21153/dlr2012vol17no1art70.
[70] Terry Hutchinson, "The Doctrinal Method: Incorporating Interdisciplinary Methods in Reforming the Law", *Erasmus Law Review* 3, No. 5 (2016): 130, https://doi.org/10.5553/elr.000055.

thought.[71] However, there are several terms that are interchangeably used to describe doctrinal legal research, such as 'traditional legal research', 'theoretical legal research', 'library-based legal research', 'basic legal research', 'arm-chair legal research', and 'black-letter law research'.[72]

Additionally, doctrinal legal research may rely on primary or secondary data. The primary data of a doctrinal legal study would inter alia include constitutions and legislations. Meanwhile, secondary data is derived from authorities such as legal books, legal articles, periodicals and commentaries, as well as cases decided by the Supreme Court and High Courts, which are binding on the lower courts.[73]

A doctrinal study does not deal with first-hand data from surveys, field studies, or other empirical tools. However, doctrinal research has its limitations, which is the availability of reliable data. This led to the emergence of the socio-legal method as a more complete doctrinal method in the second half of the 20th century to combine the study of law with the different spheres of the society.[74]

The legal research methodology inevitably faced a fundamental alteration due to the nature of the law and the development of the society. The new society requires a reform of the existing legislations to meet the new social challenges, which are the outcome of the scientific and technological developments.[75] Therefore, the socio-legal research

[71] Amrit Kharel, "Doctrinal Legal Research", *SSRN Electronic Journal* 16 (2018): 6, https://doi.org/10.2139/ssrn.3130525.
[72] Ibid., 10.
[73] Hutchinson, "The Doctrinal Method: Incorporating Interdisciplinary Methods in Reforming the Law,", 131.
[74] Kharel, "Doctrinal Legal Research,", 12.
[75] Hutchinson, "The Doctrinal Method: Incorporating Interdisciplinary Methods in Reforming the Law,", 132.

has a crucial role in addressing legal problems by adopting other disciplines to examine the quality of law and its implementation in a society to revise the legal rules systematically that best serves the social development needs.

The doctrinal legal approach provides assistance to this study to explain, examine and analytically analyze the provisions of the environmental laws and to assess their roles in protecting the rivers in Kurdistan. Therefore, this approach attempts to evaluate the existing laws and determine the sufficiency or otherwise of such laws and whether there is a need to enact new laws or reforms of the legal system on specific issues. Since this study also relies on the empirical approach in the process of data collection, it adopts a combination of the doctrinal legal method and the socio-legal method (non-doctrinal).

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(2) Socio-legal study

The socio-legal study is also called the non-doctrinal field study and can be defined as:

> "A legal research that employs methods taken from other disciplines to generate empirical data to answer the research question. It can be problem, policy or law reform based."[76]

[76] Nuraisyah Chua Abdullah , *Legal Research Methodology* (Selangor, Shah Alam- Malaysia : Thomson Reuters Asia Sdn Bhd, 2018), 20. Furthermore, some other scholars explained the socio-legal research as:
"Research into relationship of law with other behavioral sciences. It gives prominence to relationship of law with people, social values and social institutions. It endeavors to highlight the relationship between law and other behavioral sciences and social facts. It involves empirical inquiry into the operation of law. Here, inquiry is directed to some manifestation of human behavior as law affects it or as it affects law. The researcher wants to know to what extent certain legal rules work or have worked." See: Khushal Vibhute & Filipos Ay Nalem, *Legal Research Methods Teaching Material* (chilot.wordpress.com, 2009).

Therefore, doctrinal legal research is 'research in law' while socio-legal research is 'research about law'.[77]

In addition, the socio-legal method is related to studying some aspects of law in operation or in reality. Hence, this study will examine how the law works in the social reality or how the law deals (or should deal) with social issues.[78] Furthermore, socio-legal research is a study that utilizes methods taken from other disciplines to generate empirical data that can answer the research questions. Socio-legal research can also be qualitative or quantitative as it relies on examining the law from the perspective of other science disciplines to assist in drafting a new law or reforming the existing legal system.[79]

In addition, the socio-legal method is a vital tool to clarify the quality of legal practices and procedures and the regulations to provide an efficient solution for the legal activities in a society, such as businesses, social institutions and human affairs.[80] Meanwhile, the non-doctrinal method can assist in checking factors outside of the legal system to identify the reasons for the non-implementation and poor enforcement of the law. This will be of assistance to attain objective number three on the evaluation of the enforcement mechanisms of river protection. Lastly, it attempts to discover the gap between real society behavior and legally demanded behavior.[81] Therefore, this study

[77] Khushal Vibhute & Filipos Ay Nalem,71.
[78] Anwarul Yaqin, *Legal research and writing (* Kuala Lumpur: Dolphin press Shn Bhd, 2007), 10.
[79] Salim Ibrahim Ali, Zuryati Mohamed Yusoff and Zainal Amin Ayub, "Legal Research of Doctrinal and Non-Doctrinal", *International Journal of Trend in Research and Development 4*, No. 1 (January 2017): 494, ResearchGate.
[80] Abdullah , *Legal Research Methodology* , 20.
[81] Vibhute & Aynalem, 86- 88.

includes the analysis of legal texts, synthesis, and practical environmental policies on river pollution through objectives one and two.

Additionally, the nature of the research questions and their objectives necessitates adopting both the doctrinal legal research and the socio-legal method. This is because a combination of both methods in this study is more suited to the complementary approach, which minimizes bias or other limitations that might arise from using only one method. Besides that, the socio-legal method that coincides with the doctrinal legal method will endorse the study to generate more reliable data and findings to comprehensively understand the phenomenon or problem.[82]

On the other hand, the empirical approach in a legal study has a significant role in revealing the reason behind specific legal provisions or court decisions that might provide useful contributions to the legal doctrine; thus, the socio-legal approach is crucial to respond to the current development of the law.[83] Therefore, it is suggested that:

> "*Combination of methods in legal research will assist researchers in acquiring a new understanding, for instance, of legal problems, the legal provisions of enforcement systems or probably more appropriately capture the dynamics of the legal phenomenon so that they may effectively introduce a new framework to be implemented by the relevant researchers."*[84]

[82] Khadijah Mohamed, "Combining Methods in Legal Research", *Social Sciences (Pakistan)* 11, No. 21 (2016): 5191–98, https://doi.org/10.3923/sscience.2016.5191.5198.
[83] Ibid., 5194.
[84] Ibid., 5197.

Based on the above-mentioned discussion, this study adopts legal doctrinal and socio-legal research methods. This is because the legal doctrinal method is critical for analytically examining laws relating to rivers from primary sources such as legislations or secondary sources, including legal textbooks, articles and so on. However, to manage the empirical data from interviews adopted for the current study, the socio-legal method is also applied in the proposed study.

(3) Qualitative study

The qualitative approach is the best method for understanding the phenomenon in the real world based on the development of the theories by an interpretive or individualized process, as there are numerous ways for interpreting the same data.[85] The qualitative approach casts light on certain phenomena in a society to develop concepts or theories through the collection of data through words, descriptions or narrative. Furthermore, the qualitative method is different from the quantitative method as the latter is concerned with social behavior or how frequently something occurs through a quantity or amount measurement technique.[86]

However, as mentioned above, a socio-legal study can be conducted by adopting a qualitative or quantitative method. In this study, the qualitative method is employed because, to date, only a few studies have been conducted on the protection of rivers, particularly from the legal perspective of river pollution, to gather an in-depth insight about the statutory protection of rivers in Kurdistan. In short, the qualitative approach through face-to-face interviews allows a deeper insight and understanding of the legal problems relating to river pollution. Thus, the primary sources of the proposed study

[85] Abdullah, *Legal Research Methodology,* 25- 26.
[86] Yaqin, *Legal research and writing,* 138 -139.

comprise of inter alia interviews, legislations, regulations and international conventions.

1.6.2 Scope of the study

The study focuses on environmental laws to protect rivers. This study is focused on the Tanjero River located in the Kurdistan region in the north of Iraq. This is due to several reasons. First, the river became the most threatening and serious river pollution example in Iraq. Second, the impacts of polluted water of the river cause pollution for other rivers in the river inside the region, such as Darbandikhan Lake and Serwan River, it also poses a risk to the quality of other rivers in middle and south of Iraq, such as Tigris River. Lastly, Tanjero River has a long history back to 1980s and continues till now. However, the result of the study definitely can be applicable to tackle pollution for other rivers as well. This study examines the laws relevant to river protection, such as Law No. 8 (2008) for Environmental Protection and Improvement in the Kurdistan Region of Iraq, among others. Furthermore, the study also attempts to theoretically assess Law No. 4 (2022) for Water Management and Protection in the Kurdistan Region of Iraq, a new water law enforced on September 6, 2022, while the study is completed in October 2022.

In terms of the duration of the framework for the proposed study, it is limited from 2005 until the submission of this thesis so it will be a current study. The starting point of 2005 was chosen for two main reasons. Firstly, in 2005, the Iraqi Constitution was passed and the KRG was recognized by the new Iraqi Constitution. Secondly, in 2005, the KRG began as a union government over four governorates of Kurdistan. Prior to 2005, the KRG was governed by two local governments and managed by the two main

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political parties, namely the Kurdistan Democratic Party (KPD) and the Patriotic Union of Kurdistan (PUK).

1.6.3 Types of data

The study relies on both primary and secondary data. The primary data is gathered for the first time by the researcher through direct efforts and experience, specifically for the purpose of addressing the problems of this study.[87] In terms of legal study, the primary data includes legislative, case law, formal and authoritative records of the law such as conventions, constitutional provisions, Islamic legal rules, statutory provisions by the legislative authority, subsidiary legislations (such as rules and regulations) made by administrative bodies and authorities, and decisions of the courts and tribunals.[88] Thus, the primary data for this study includes international conventions, statutes, subsidiary legislations and interviews.

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Simultaneously, this study also uses secondary data, namely second-hand information previously collected and recorded by anyone other than the user for a purpose unrelated to the current research problem. This secondary data is available from various sources such as books, journals, encyclopedias, digests of cases, indexes, official statistics, local or international documents, government or international bodies reports, and other library-based sources.[89]

[87] Abdullah , *Legal Research Methodology*, 155- 157.
[88] "Primary and secondary sources", Tufts University Libraries, accessed November 30, 2019, https://researchguides.library.tufts.edu/c.php?g=248934&p=1657934.
[89] Abdullah , *Legal Research Methodology*, 156.

1.6.4 Data Collection methods

This study utilizes theoretical and empirical data from various primary and secondary sources. The objectives of the study require it to conduct both the library-based and empirical methods to gather sufficient data on the topic.

(a) Library-based method

To attain the objectives per the doctrinal method, this study adopts the library method to elicit information from documented sources and texts available in the libraries in Malaysia and Kurdistan.

Therefore, this study attempts to gather information on the topic through relevant literature that is available from the library in the form of secondary sources, which comprises both published and unpublished data such as textbooks, treatises, commentaries on statutes, law theses, journal articles, abstracts, bibliographies, dictionaries, encyclopedias, indexes, newspapers and so on. The secondary sources were obtained by the researcher by accessing the related data.

Secondary data may be able to assist the researcher to shed light on the research questions for a better understanding of how to answer these questions logically and systematically and to assist the researcher in concentrating on primary studies on a larger scale. However, the secondary data has limitations. For instance, these data are chiefly self-managed, meaning they need to be carefully examined and evaluated. Another disadvantage of secondary sources is that they often do not contain the exact information required by the researcher and unable to present the latest information on

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the topic.[90] Therefore, this study attempts to overcome the limitations of secondary data with primary data by using empirical method such as interviews to obtain relevant and updated information to achieve the research objectives.[91]

(b) Interview

According to the socio-legal method, the empirical approach via face-to-face interview is crucial to address the study questions and objectives. A library-based method might not be able to sufficiently cover this study's requirements; therefore, this study employs an empirical method of data collection via face-to-face or online interviews to generate relevant empirical data to highlight the context of the law, such as how the law works in real-life society. In other words, it examines how environmental laws and regulations protect rivers in Kurdistan. The empirical method for data collection assists the researcher in obtaining primary data related to the problem of the study while overcoming the limitations of the secondary data, which may no longer be valid, current, or relevant to the proposed topic.[92]

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In addition, an interview is a qualitative tool that is able to gather data from first-hand information that is needed for this study.[93]. Therefore, this study chooses not to carry out a survey because it requires a larger population in the quantitative approach. In contrast, a qualitative study mostly involves a smaller number of people or groups, allowing the researcher to achieve in-depth knowledge from the interviews.[94]

[90] Ibid.,158- 159.
[91] Ibid.
[92] Yaqin, *Legal research and writing,*12-14.
[93] Abdullah, *Legal Research Methodology,*156.
[94] Yaqin, *Legal research and writing ,*139.

The respondents of the interview were specifically selected (purposive sampling) to answer the related questions. The number of respondents is 15 (Table 1.2).

Table 1. 2

Sampling Design for respondents

No.	Agency	Number of respondents
1.	Kurdistan Parliament	3
2.	Enforcement Institution from KRG	4
3.	Academic	3
4.	NGO	3
5.	Representative of the Resident (Community leader)	1
6.	Resident	1
	Overall: 15 Respondents	

Additionally, the qualitative approach for the legal study using in-depth face-to-face and online interviews lends assistance in discovering and clarifying the thoughts and opinions of the other respondents on the specific law and institution in terms of their perception of the real facts.[95] Thus, this study adopts the semi-structured interview method to accomplish its objectives.

A semi-structured interview is useful for this study as it allows the respondents to answer questions freely and conveniently based on the topic instead of following a specific structure. Therefore, an open-ended questionnaire, a flexible way of asking questions, was offered. A semi-structured interview also enables the researcher to ask further questions that may arise from a previous response to acquire specific

[95] Abdullah, *Legal Research Methodology* ,25.

knowledge about the study from the respondents.[96] Therefore, the study had one interview protocol, which served as a guide for the respondents, since the protocol included all questions developed based on research questions and objectives. In other words, the study had one list of questions under the interview protocol. To ensure the reliability of the responses, different questions for different respondents were selected to be asked according to the background and expertise of each respondents.

In addition, the selected respondents were purposively chosen. For instance, three parliament members as legislature or lawmakers were chosen from different political backgrounds to examine their contrasting views regarding the problem. As different governmental institutions enforce water-related laws and regulations, the study interviewed four respondents in the most relevant and responsible institutions and positions such as the EPI Board, the MoMT, and the MoAWR. In addition, three academics who are professors or Ph.D. holders from different universities in Kurdistan were interviewed to obtain their scientific views on the subject and the legal shortcomings that could further enrich the outcome of the study. [97]There are several local NGOs that have made tremendous efforts to protect the environment, particularly the Tanjero River. Therefore, three respondents from two NGOs have been interviewed (Waterkeepers Iraq Organization, Kurdistan Nature Organization). This study also interviewed two respondents, one who is a head of the residence community representative of the people living in Tanjero River area, another who is the normal residence nearby Tanjero River. These interrelated dimensions are carefully

[96] Ibid.,186.
[97] Respondent 1: Prof., College of Law, Salahaddin University, Hawler. Re 2: Assistant prof. in Ecology and Pollution/Water Pollution, University of Sulaimani/ College of Science/Department of Biology. Re 3: Lecturer, expert area: Water resources management, Garmian University, Kalar.

considered in choosing the appropriate interview approaches with an acceptable number of respondents.

In-depth interviews with relevant policymakers are very useful to examine the primary data, especially concerning the constitution, legislations, regulations and rulings of environmental administrative authorities. These interviews significantly contribute to identifying the legal lacunae and weaknesses and gathering ideas on how to make the legal administrative system more efficient to protect and maintain the rivers by recommending an appropriate legal framework. In the event of any difficulty in getting the proposed number of respondents, the study has an alternative plan i.e. by replacing the respondent with another from the same category or reducing the number of respondents. This is because it is possible to interview even a sole respondent in a qualitative study. However, library-based data may be able to buttress the study and overcome the limitations of the empirically gained data.[98]

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Nevertheless, the study considered some ethical rules and principles. All respondents agreed and signed to participate as a respondent in the study interview; thereby, the respondents received two forms; first named information consent form, which is an invitation to participate in the interview. Therefore, brief information provided about the researcher and his study, the objectives of the study and some personal information was asked such as area of interviewee experty, contact and signature. The second form was the interview protocol, which start with some demographic information of the

[98] Ibid.,20.

respondents with the list of interview questions. However, confidentiality was also taken into account by asking respondents whether to mention their name in the study.

However, due to the spread of Covid-19, for the safety of the respondents, most of the interviews were conducted online, except for several respondents who were interviewed face to face, following strict protection procedure such as wearing face masks.

1.6.5 Analysis of data

Analyzing data is one of the most critical stages of a legal study, initiated after the data collection process. This study combines different data analysis approaches to achieve the objectives, namely analytical, critical, content analysis, historical, descriptive and thematic approaches. The analytical and critical approach are mostly used in legal doctrinal research through carefully examining the existing laws and legal framework. However, this study attempts to determine the adequacy or otherwise of such laws and regulations in combating river pollution by giving real evidence and logical reasons.[99] This was done through a contextual and critical analysis of the relevant legal texts.

Moreover, by applying the above-mentioned approaches, this study attempted to analyze the views, ideas and experiences of the researchers and scholars from their scientific publications, which can be used to reduce the gap. Historical, descriptive, analytical and critical approaches were applied in some aspects, starting from the literature review section which mainly relies on the critical and sometimes descriptive approach. To clarify the concept of sustainability to accomplish the sustainable

[99] Yaqin, *Legal research and writing*, 16.

development goals relevant to water protection in the 2030 Agenda, this study chiefly applies the historical and descriptive approaches in Chapter Two. To explain and identify the barriers in the implementation of the law to protect the rivers in Kurdistan, the study adopts analytical and critical approaches. Likewise, in certain areas, this study needs to be descriptive to explore and understand the actual condition of the river pollution issues such as Tanjero River pollution, to inter alia identify the sources of pollution, threats and challenges in this case. Hence, this study attempted to identify shortcomings and lacuna in the relevant laws and administrative system by adopting these different methods.[100]

The thematic method is also applied in the process of analyzing the information collected from the interviews. Transcription as a part of the qualitative method commences after the interviews have been conducted to transform the data gathered for the analytical process by aligning the answers through a coded text based on themes and labelling the coded categories to observe the range.[101] The transcription and analysis for the interview data were conducted using the *Atlas ti* software to save time and to more accurately categorize and analyze the relevant data. This software also facilitates the application of the thematic approach in the data analysis process.

In terms of reliability, authenticity and comparability of the data in the data analysis, this study examines the empirical data from the latest available literature and other library-based sources. Likewise, empirical data is sometimes a good and reliable tool for overcoming the limitation of secondhand data, which might not be current or

[100] Ibid.,15; Abdullah, *Legal Research Methodology*, 24.
[101] Abdullah, *Legal Research*, 206-211.

relevant to the topic compared to the empirical data obtained by the researcher directly from the relevant respondents.

However, this study relies on reliable data and irrefutable evidence, which circumvent the possibility of a biased judgment. Nevertheless, this study is aware of copyright rules and plagiarism and will undoubtedly respect the works of other scholars.[102] In any event, the whole study is subject to scrutiny for plagiarism before its submission to the school.

1.7 Limitations of the Study

It is undeniable that every study encounters some difficulties and limitations; while the researcher may expect some, some others can occur unpredictably. During the preparation of this study, several difficulties were encountered before or during the writing stage, especially in the circumstances below:

1. Lack of accessibility of data from universities in Iraq because of the unstable security in Iraq and the difficulty in accessing libraries and Iraqi universities. Furthermore, the Covid-19 pandemic also affected this study, specifically the quarantine restriction. Therefore, as an alternative, online databases were used, coinciding with the face-to-face interviews. Moreover, the respondents were mainly interviewed online as an alternative option.

[102] Camille Yip, Nian-Lin Reena Han, and Ban Leong Sng , "Legal and Ethical Issues in Research," *Indian Journal of Anaesthesia* 60,no.9 (September 2016) : p 684-688, doi: 10.4103/0019-5049.190627 ; Ng Chik Jenn, "Common Ethical Issues In Research And Publication," *Malays Fam Physician* 1, no. 2&3 (August 2006): 74–76, PMID: 27570592; PMCID: PMC4453117.

2. Difficulty in obtaining judicial applications such as court decisions within the field of study in Kurdistan. This may be due to a lack of transparency and accessibility of court decisions. However, the study attempted to mention court cases from other countries, particularly regarding recognition of the right to access clean water as a human right.

1.8 Literature Review

In accordance with the problem statement and research objectives, the literature review section includes the legal framework for river protection, which starts with a discussion on the international conventions on water, river pollution in the Kurdistan region particularly the Tanjero River, and river protection under the prevailing law in Kurdistan.

1.8.1 Legal Framework for River Protection

The comprehensive discussion of the legal framework for river conservation requires the international scenario of river protection, which comes from international and regional efforts to enable a roadmap to be formulated in respect of a statutory water policy to assist countries in developing their legislations relating to water. Therefore, before analyzing the existing laws related to rivers in Kurdistan, this study discusses the relevant international legal provisions governing river pollution.

(a) International Legal Framework for River Protection

There are several international conventions that discuss provisions related to environmental protection, including water. Even though existing international principles emphasize the duty of governments and other international characters in

preserving the ecosystem and preventing its degradation, water management particularly river basin management and the prevention of adverse human impacts on river water quality may require a more explicit recognition to impose clear obligations upon governments and individuals to protect the environment particularly rivers**.**

Therefore, this study discusses the existing environmental principles within the international conventions to examine some of the provisions that might assist the national legislature in protecting the environment, particularly rivers. The following are some of the conventions directly or indirectly related to water protection.

(i) United Nations Conference on Human Environment (UNCHE) in 1972

The United Nations Conference on the Human Environment (UNCHE) was held in Stockholm from June 5 to 16, 1972. Upon the invitation of the General Assembly Resolution 2850 (XXVI), 113 state representatives (including Iraq) attended the conference. The importance of protecting and improving the environment was highlighted as a crucial issue that has an impact on global social well-being and economic development.[103]

By adopting some of the principles, the Conference clearly made it an obligation for all member states to protect the environment, including water. As an illustration, Principle 2 states that:

> "*The natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future*

[103] For instance, Part I of the Conference provided that: "2. The protection and improvement of the human environment is a major issue which affects the well-being of peoples and economic development throughout the world; it is the urgent desire of the peoples of the whole world and the duty of all Governments. United Nations, "United Nations Conference on Human Environment." UN, 1972. https://doi.org/10.1080/00103829.1973.10877486.

generations through careful planning or management, as appropriate."[104]

Furthermore, the countries are mandated to protect marine life and other living sources by prohibiting sea contamination.[105]

Moreover, the Conference adopts certain general principles for assessing and controlling marine pollution. Although these principles should be approved and endorsed by the governments of the member states of the Conference, including Iraq, some of the principles clearly recognized the legal mandate of the governments to prevent water pollution. For example:

> *"(4) States should ensure that their national legislation provides adequate sanctions against those who infringe existing regulations on marine pollution.*
> *(8) Every State should cooperate with other States and competent international organizations with regard to the elaboration and implementation of internationally agreed rules, standards and procedures for the prevention of marine pollution on global, regional and national levels."*[106]

Based on the provisions of the UNCHE 1972, although there is no clear provision explicitly related to river protection or river basin management, some principles

[104] Ibid.
[105] This can be seen in principle 7, which states that, "States shall take all possible steps to prevent pollution of the seas by substances that are liable to create hazards to human health, to harm living resources and marine life, to damage amenities or to interfere with other legitimate uses of the sea." On the other hand, the conference makes it a duty for the countries to cooperate in order to improve the international law with respect to the legal responsibility and compensation for the victims of environmental damage. Principle 22 states: "States shall cooperate to develop further the international law regarding liability and compensation for the victims of pollution and other environmental damage caused by activities within the jurisdiction or control of such States to areas beyond their jurisdiction."
[106] UNCHE, 1972, Annex III, General Principles for Assessment and Control of Marine Pollution, P.73, https://doi.org/10.1080/00103829.1973.10877486.

indirectly (as mentioned above) mandate the governments to protect the environment including water resources, by preventing or minimizing environmental pollution including water pollution. Since rivers, in many cases, are considered one of the factors that contribute to sea pollution, the member states of the UNCHE have the responsibility to prevent all types of pollution or discharge any harmful substances into seas or rivers.

(ii) United Nations Water Conference 1977 (Mar Del Plata Action Plan)

The United Nations Water Conference (UNWC) was a crucial water conference held in Mar Del Plata, Argentina, from March 14 to 25, 1977. The recommendation of the Conference is known as the "Mar Del Plata Action Plan", which the Conference strongly encouraged all the respondent states to implement. The "Mar Del Plata Action Plan" is a vital guidance for the countries to establish their national water policies and legal framework as the Conference proposed some comprehensive rules relevant to water such as water supply and demand management, legal framework, institutional arrangement, and water usage efficiency for different purposes such as industrial, agricultural, and electrical generation. Even though Iraq is a party to this Plan, the problem of river pollution in Kurdistan remains unsolved. The important points to consider for each signatory party in the Plan are summarized as follows (Table 1.3).

Table 1.3

Important parts of the Mar Del Plata Action Plan

Plan	Provisions	Recommendations
Assessment of water resources	3 (a)	Data on Water Resources Establish a national body with comprehensive responsibilities for water-resources data.

Water use and efficiency	7, Paragraph 5-33, Page 9	Effective legislation and to promote the efficient and equitable use and protection of water and water-related ecosystems.
Policy, planning, and management	Paragraph 41-61, Page 28	Water policy, planning and management to consider and develop: National water policy, Institutional arrangement, Legislation, Public participation, and Development of technology.
Institutional arrangement	46, 47, 48	To ensure the use of advanced technologies where appropriate, adequate coordination of central and local administrative authorities.
Environment, Health and Pollution control	Paragraph 34-40, Page 23.	The Action plan highlighted the environmental and health impacts of poor water resources management. Therefore, water pollution control should be highly considered in facing environmental and health hazards.

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More importantly, the Action Plan has specific recommendations for the member states to consider in developing existing water-related legislations,[107] on top of

[107] The Action plan also include some critical provisions in this regard, such as, "(b) A review of existing legislation be prepared in order to improve and streamline its scope to cover all aspects pertaining to water resources management; protection of quality, prevention of pollution, penalties for undesirable effluent discharge, licensing, abstraction, ownership, etc.;(c) Although legislation should generally be comprehensive, it ought to be framed in the simplest way possible and be consistent with the need to spell out the respective responsibilities and powers of governmental agencies and the means for conferring rights to use water on individuals; (d) Legislation should allow for the easy implementation of policy decisions which should be made in the public interest while protecting the reasonable interests of individuals; (e) Legislation should define the rules of public ownership of water projects as well as the rights, obligations and responsibilities and emphasize the role of public bodies at the proper administrative level in controlling both the quantity and quality of water. It should appoint and empower appropriate administrative agencies to carry out this controlling function and to plan and implement

encouraging international organizations and other endorsing institutions to work together for the benefit of others.[108]

(iii) The United Nations Conference on Environment and Development (UNCED), Rio Declaration in 1992

Held in 1992, this conference is one of the most crucial international efforts that concentrate on environmental issues, which require initiatives at the global level to preserve human life on earth. The United Nations Conference on Environment and Development (UNCED) was held in Rio de Janeiro in Brazil, from June 3 to 14, 1992, and also known as the "Earth Summit". The conference reaffirmed the outcome of the Stockholm conference (UNCHE) which was held on June 16, 1972, and sought to build on it. Therefore, the Conference adopted the Rio Declaration, which includes several environmental principles. These principles have been and still continue to be a guide for the states to step into environmental protection and coincide with the development process through different mechanisms. For instance, Principle 4 states:

> *"In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it."*[109]

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water-development programmes. It should also spell out, either in primary or subordinate legislation, administrative procedures necessary for the coordinated, equitable and efficient control and administration of all aspects of water resources and land-use problems as well as the conflicts which may arise from them; (f) Legislation should take into account the administrative capacity to implement it; (g) Countries should document and share their experience so as to have a basis for possible improvement of their legislation; (h) Priority should be accorded to the effective enforcement of the provisions of existing legislation, and where necessary, administrative and other arrangements should be strengthened and rendered more effective to achieve this objective."

[108] Salman M A Salman and Daniel D Bradlow, *Regulatory Frameworks for Water Resources Mangement*(TheWorldBank,2006),http://documents.worldbank.org/curated/en/605641468341096140/pdf/362160rev0Regulatory0water01PUBLIC1.pdf.

[109] "Report of the United Nations Conference on Environment and Development - Rio Declaration on Environment and Development", UNCED, Rio de Janeiro: United Nations,1992,2.

Furthermore, the Rio Declaration emphasizes that upon the adoption of efficient environmental laws, standards and management, as stated in Principle 11:

> *"States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries."*

In addition, Principle 13 encourages the states to adopt sufficient legal tools in their national environmental laws regarding the responsibility and compensation for environmental damage. It states:

> *"States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage…"*

The Conference's declaration is also a guide for the respondent members to adopt certain protective approaches within their national laws, such as the Precautionary approach, Polluter pay approach, and Environmental Impact Assessment (EIA). This is stated in Principle 15:

> *"In order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation."*

In terms of the Polluter pay approach, Principle 16 states that:

> *"National authorities should endeavor to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to*

the public interest and without distorting international trade and investment."

Nevertheless, as mentioned, the declaration comprises a provision that assists states in adopting the EIA as a monitoring tool to protect the environment through an assessment of projects that have an impact on the environment. Principle 17 states:

"Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority."

On the other hand, the Rio Declaration paved the way for public participation in environmental management issues. The participation of the local community is a vital tool for endorsing environmental institutions to successfully manage environmental issues.[110]

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To sum up, although the UNCED or the Rio Declaration did not include explicit provisions relevant to river protection, there are some critical principles and tools that the national legislature can appropriately adopt to develop a national environment law to provide sufficient and efficient conservation of all the environmental components, particularly rivers.

[110] Principle 22 states: "Indigenous people and their communities and other local communities have a vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development."

(iv) Dublin-Rio Principles 1992

The Dublin Statement on Water and Sustainable Development was accepted in the International Conference on Water and the Environment (ICWE) on January 26-31, 1992, comprising four water principles. It was submitted to the UNCED in Rio de Janeiro on June 3-14, 1992, hence the name "Dublin-Rio Principles". Principle 1 states:

> *"Fresh water is a finite and vulnerable resource, essential to sustain life, development, and the environment."*

This principle highlights the importance of water resources for life, development and the ecosystem. It declares that fresh water is limited and might face more stress and challenges, threatening water availability. Therefore, holistic management should not only be concerned with the management of natural systems, but also needs coordination between different human activities, which will cause an increase in water demand. The establishment of economic policies on water requires coordination among the different policymakers (from national ministries to local government or community-based institutions).[111]

Moreover, the Dublin Principle mentions the "Participatory approach" as stated above, which was proposed to the UNCED in 1992. Principle 2 states that:

> *"Water development and management should be based on a participatory approach, involving users, planners, and policy-makers at all levels."*

[111] Global Water Partnership, "Dublin-Rio Principles", *Water*, vol. 46 (Stockholm, 2011), https://www.gwp.org/contentassets/05190d0c938f47d1b254d6606ec6bb04/dublin-rio-principles.pdf.

This is because water is a basic fundamental need that has social value for all. A participation approach requires the stakeholders at all levels of the society to have an influence on the decision-making process at the different levels of the water management structure. Thus, the government at all levels will have the mandate to participate. This can be done by creating mechanisms for stakeholder consultation. Governments should also assist in developing the participatory capacity, especially among women and other marginalized social groups.[112]

In fact, the Dublin Statement proposed to grant women a significant role in water management because they play a key role in water utilization for different purposes, especially for domestic and agriculture. Therefore, Principle 3 calls for a bigger role for women in the decision-making of water-related issues. This Principle states:

> *"Women play a central part in the provision, management and safeguarding of water."*

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Therefore, it is crucial to develop the national environmental law to encourage a wider public participation, particularly women who would be able to put into practice their critical role in water management. Meanwhile, Principle 4 casts light on other essential water issues, namely the social and economic value of water. It states:

> *"Water is a public good and has a social and economic value in all its competing uses."*

Based on that, the water policy should be revised to provide access to clean water and sanitation at an affordable price and establish a comprehensive water management system in quality and quantity. This is because water is essential for human life for

[112] Ibid.

both the current and future generations, which would require rationalizing its utilization. Furthermore, failure to recognize the economic value of water has caused wastage and degradation of environmental resources.[113]

Value and charges are two different ideas. This is because "the value of water in alternative uses is important for the rational allocation of water as a scarce resource, whether by regulatory or economic means. Charging for water is an economic instrument to affect behavior towards conservation and efficient water usage, provide incentives for demand management, ensure cost recovery, and signal consumers' willingness to pay for additional investments in water services".[114]

In brief, these principles serve as a guide in the preparation of water policies, strategies and legislation all over the world. This is known as the Magna Charta for water resources management. Such principles, like the Rio Principles, greatly impact our mindset to rethink and widely understand the development and sustainable management of water.[115] Thus, there is no better time than now to do so.

(v) Marrakech Declaration in 1997

The Marrakech Declaration in 1997 was an initiative to address the urgent need for a better understanding of water-related challenges from inter alia the legal, environmental, social, and economic perspectives. This Declaration had pushed countries to revise their water policies by following some of the principles and mechanisms laid under it, which also emphasized that legislation is a vital requirement

[113] Ibid.
[114] Ibid.
[115] Salman M A Salman and Daniel D Bradlow, *Regulatory Frameworks for Water Resources Mangement*, 7.

in formulating efficient water policies. Hence, proper management and an effective preservation of water resources such as rivers would require a methodical water legislation.[116]

(vi) OECD Principles on Water Governance 2015

The Organization for Economic Cooperation and Development for Europe (OECD) principles include 12 principles on water governance to shape and implement effective, efficient, and inclusive water policies based on a shared responsibility with a wider range of stakeholders. The principles were generated using a multi-stakeholder approach within the OECD Water Governance Initiative, and backed by ministers at the OECD Ministerial Council Meeting on 4 June 2015. [117] To overcome current and anticipated water challenges, OECD Principles has a crucial role in providing robust public policy, measurable targets, and objectives based on a clear timeline and tasks by the relevant authority under a regular and proper monitoring system. OECD Principles, through three dimensions of water management, contribute to developing public policy, which are:[118]

First: *Effectiveness*: To form clear sustainable water policy goals and targets at different government levels, apply these policy goals, and accomplish highlighted targets.

Second: *Efficiency:* To improve the benefits of sustainable water management and welfare with the lowest society cost.

[116] Ibid.,9

[117] OECD Principles on Water Governance (2015), https://ceowatermandate.org/resources/principles-water-governance-2015/

[118] OECD Principles on Water Governance, adopted by the OECD Regional Development Policy Committee on 11 May 2015, Welcomed by Ministers at the OECD Ministerial Council Meeting on 4 June 2015, https://www.oecd.org/publications/implementing-the-oecd-principles-on-water-governance-9789264292659-en.htm

Third: *Trust and Engagement*: This dimension is relevant to the contribution of water governance by improving public confidence and creating comprehensive participation of stakeholders according to democratic legitimacy and fairness for the whole society. (Figure 1.3)

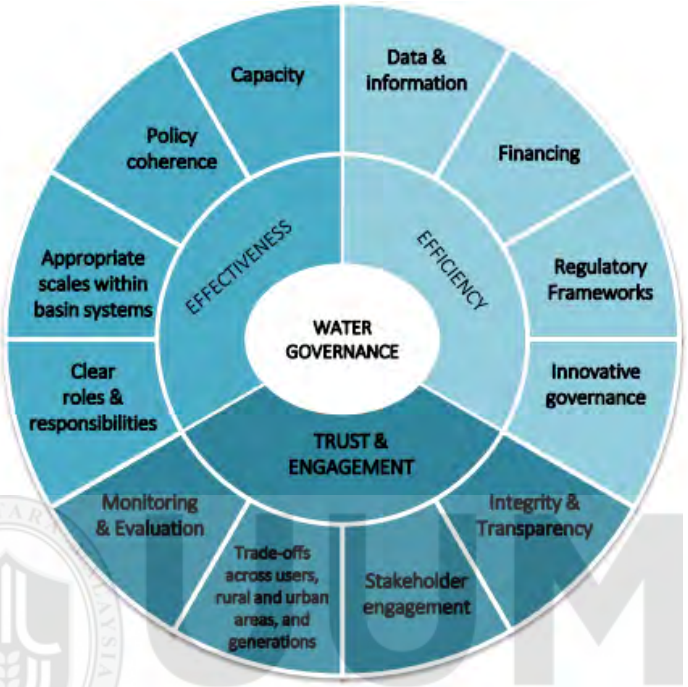

Figure 1.3: The OECD Principles on Water Governance
Source: (OECD Principles on Water Governance, 2015)[119]

The OECD Principles attempt to set standards for effective, efficient, and comprehensive design and implementation of water policies through 12 must-do principles. The OECD principles emphasize on some critical aspects of water management and protection, for instance, to "clearly allocate and distinguish responsibilities for water policymaking, implementation, and foster coordination across the responsible authorities, improve water management based on integrated basin governance systems, encourage policy coherence through effective cross-sectoral coordination, capacity building of responsible authorities, generate, update,

[119] Ibid.

and share timely, consistent, comparable water and water-related data, promote water finance and allocate financial resources efficiently, ensuring that water management regulatory frameworks are effectively implemented and enforced, also ask the implementation of innovative water governance practices across responsible authorities, integrity and transparency practices across water policies, institutions, and governance framework, promote stakeholder engagement, manage trade-offs across water users, rural and urban areas, and promote regular monitoring and evaluation of water policy and governance." [120]

In addition, the aim of the Principles is to develop water management systems that assist in governing "too much", "too little", and "too polluted" water in a sustainable, integrated and comprehensive way, with acceptable cost, and in a reasonable timeline. They consider that governance is good if it succeeds in tackling key water challenges, combining both bottom-up and top-down processes while encouraging constructive

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[120] These 12 principles which are as follows**,** "1. Clearly allocate and distinguish roles and responsibilities for water policymaking, policy implementation, operational management and regulation, and foster coordination across these responsible authorities. 2. Manage water at the appropriate scale(s) within integrated basin governance systems to reflect local conditions and foster co-ordination between the different scales. 3. Encourage policy coherence through effective cross-sectoral coordination, especially between policies for water and the environment, health, energy, agriculture, industry, spatial planning and land use. 4. Adapt the level of capacity of responsible authorities to the complexity of water challenges to be met and to the set of competencies required to carry out their duties. 5. Produce, update, and share timely, consistent, comparable and policy-relevant water and water-related data and information, and use it to guide, assess and improve water policy.
6. Ensure that governance arrangements help mobilize water finance and allocate financial resources efficiently, transparently and timely. 7. Ensure that sound water management regulatory frameworks are effectively implemented and enforced in pursuit of the public interest. 8. Promote the adoption and implementation of innovative water governance practices across responsible authorities, levels of government and relevant stakeholders. 9. Mainstream integrity and transparency practices across water policies, institutions, and governance frameworks for greater accountability and trust in decision-making. 10. Promote stakeholder engagement for informed and outcome-oriented contributions to water policy design and implementation. 11. Encourage water governance frameworks that help manage trade-offs across water users, rural and urban areas, and generations. 12. Promote regular monitoring and evaluation of water policy and governance where appropriate, share the results with the public and make adjustments when needed."
See: OECD Principles on Water Governance (2015), https://ceowatermandate.org/resources/principles-water-governance-2015/

state-society relations. A bad governance system is one that brings extra costs and does not respond to place-based needs. Therefore, it is necessary to reconsider all these 12 OECD principles by local governments for better water management. The Iraqi government and KRG should thus pay further attention to all existing international rules and principles including OECD Principles to improve river governance towards achieving a more sustainable system.

Furthermore, international conferences regarding water management, including river protection, is crucial for KRI to improve water law towards sustainable river management. The region has a legal mandate based on Law No. 8 (2008) for Environmental Protection and Improvement to coordinate with the Iraqi federal government through the Ministry of Environment regarding existing international environmental conventions. As stated in Paragraph 8, Article 3:

> *"Eighth: The Ministry should communicate and coordinate with the Iraqi environment Ministry in all things related to international agreements."*

Although the above provision is not specifically mentioned to the water conference or environmental convention, it still applies to all conventions, whether about water or river, environmental issues, or any other relevant conventions. Therefore, the KRG has obligation to coordinate with the Iraqi government to enforce all environmental principles and rules under international water conventions, which Iraq has ratified.

In addition, the New Water Law No.4 (2022) for Water Management and Protection does not mention any mechanisms to be followed in implementing international water conventions. However, the KRG has not actively responded to all existing water

agreements. Some rules and principles have been considered, such as the EIA as recommended by Principle 17 under UNCED 1992. Meanwhile, water law in the region still does not pay attention to the role of women regarding water management as highlighted and asked by the Dublin Principles 1992.

(b) River Pollution in the Kurdistan Region, Iraq

Many studies had been conducted in Kurdistan on the protection of the environment in general, but only a limited number had studied the legislative protection of water resources. In respect to the rivers in the region particularly the Tanjero River, the available studies illustrated high water contamination, which undoubtedly causes negative socio-economic consequences due to the interrelations between the river and most socio-economic sectors such as agriculture, industries, health, and education.

Scientific studies have found that the surface and ground water of some rivers are not suitable for drinking based on the WHO water drinking standards. Specifically, the studies indicated that the Tanjero River water is significantly polluted with heavy metals such as chromium, iron, manganese, nickel and sulfate, nitrite, and ammonia. There are also high amounts of physio-chemical parameters, high BOD and COD values, and even the presence of fecal coliforms in high ranges. The astounding result, which shows that the surface and ground water are polluted certainly have an influence on the environment of the Tanjero River and its basin. In addition, the studies found that the agricultural topsoil in the area is polluted with heavy metals (Cu, Ni, Cd, Np and Zn) due to the sewerage system of the Sulaymaniyah city whereby industrial wastes contributed severely to the contamination of the Tanjero River.[121] Although

[121] Mustafa, "Impact of Sewage Wastewater on the Environment of Tanjero River and Its Basin within Sulaimani City/NE-Iraq"; Aziz, M. Salih, and Hama-Salah, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District; Al-hasnawi, "Water Quality Index Of Tanjero River Basin Near Sulaymania City"; Nizar Y Hamasalh, "

this study highlights the problem of river pollution in the Tanjero River, it does not examine relevant legislations to address the legal challenges of river pollution.

In essence, the pollution of the rivers (including the Tanjero River) has caused dire consequences on the socio-economic sectors. Hence, to avoid the acceleration of the multi-dimensional problems of river pollution, intensified efforts are needed to tackle the issue by formulating an adequate and efficient legal framework and sustainable river management.

(c) The Existing Laws and Legal Framework for River Protection in Kurdistan

In 2020, a study was carried out in China titled "Industrial Water Pollution in Dongying City, the Yellow River Delta of China".[122] The study mentioned that river pollution harms human health and the country's economy and further indicated that despite some governmental initiatives and environmental legislative amendments in 2015, the attempt to prevent river pollution still faced major challenges due to the absence of a clear legal framework, lack of coordination, and the overlapping of responsibilities among the different institutions. This caused a setback in law enforcement under the current legislation. For instance, the study referred to the Ministry of Water Resources (MoWR) as the main water institution in China, while

Water Quality Index (Wqi) of Some Wel ls Located In The Region of Kani Goma and Kanasura in Su laimani Governorate", Journal of Zankoy Sulaimani- Part A (JZS-A) 16, No. 1 (2014); Khwakaram et al., "Application of Water Quality Index (WQI) as a Possible Indicator for Agriculture Purpose and Assessing the Ability of Self Purification Process by Qalyasan Stream in Sulamani City/Iraqi Kurdistan Region (IKR)", *International Journal of Plant, Animal and Environmental Science* 5, No. 1 (2015): 162–73; Majid, Khwakaram, and Gado, "Pollution Status Evaluation of Some Heavy Metals along Some Surface Water Sources by Multivariate Data Analysis at Sulaimani Governorate".

[122]Jiaxin Tan "Industrial Water Pollution in Dongying City, the Yellow River Delta of China", (PhD diss., Universitäts-und Landesbibliothek Bonn, 2020).

the Ministry of Environmental Protection (MEP) is the current primary authority controlling water pollution. The study further stated that "China's organizational structure of water resources management is a complex and multi-layered system". Every ministry has different organs within its authority and these bodies have poor coordination in implementing the national water policies and legislations.

Although the aforementioned study only focused on river pollution caused by industrial wastes, it is still a relevant discourse because the same problem exists in Kurdistan's water resources as in the case of the Tanjero River, Great Zab River, and Serwan River, which is a result of a complex legal framework that allowed several different institutions to be in charge of the river issues.

Mohammed in his study in 2019[123] claimed that the protection of water under the environmental Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq is too brief and limited. According to him, the current provision is not enough to solve the current problem since the provisions do not address significant issues such as wastewater and solid waste disposal into the water and are inadequate to combat the various types of pollution and attacks on marine life.[124] He also stressed that the absence of clear regulations under Law No. 8 (2008) has become an obstacle to the government authorities and courts in the implementation of the law on environmental issues.

[123] Mohammed, "Critical Remarks on the Law of Protection and Improvement of the Environment in the Kurdistan Region - Iraq No.(8 of (2008),", 837.
[124] Ibid.

However, economic growth has a significant impact on the environment, particularly river water resources. For example, a 2014 study examined how the development of industries in recent years in Kurdistan affected the quality of water resources by carrying out a general indexing of the quality of pollution in surface water.[125]

The study found that Kurdistan experienced a noticeable economic growth after 2003. Nevertheless, it noted that the major industries were concentrated in the river basin area and exploited the river without any consideration for the environment and human health. The study also found that the direct disposal of waste to the river by these industries exacerbated the problem of water pollution in Kurdistan. Besides the extractive industrial projects, the study also noted other factors that contributed to river pollution such as domestic, municipal, industrial, oil, medical, and agricultural wastes.[126]

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Moreover, the study did not include an analysis of the legal framework and the role of the authorities responsible for the protection of the environment and monitoring of industries that contributed to the degradation of the environment. Thus, this current study focuses on the examination of the current legal framework to determine the efficiency of enforcement in the preservation of rivers.

In 2016, a legal study was conducted by Arez Mohammed to analyze the legal responsibilities of oil companies in the protection of the environment as a social and ethical obligation. The study found that these companies breached their duty to protect

[125] Ibid., 38.
[126] Ibid., 36.

the environment[127] since there was no specific legislation for the protection of the environment (including rivers) from harmful oil and gas activities in Kurdistan. The Oil and Gas Law No. 22 (2007) in Kurdistan Region of Iraq authorizes the Ministry of Natural Resource to regulate laws for the protection of the environment. However, according to the author, the problem of inadequacy of the substantive law and its enforcement as the main obstacle for the oil and gas companies in carrying out their ethical and social responsibilities, including the duty to preserve the environment in Kurdistan. He also concluded that the enforcement of the legal rules was more crucial than merely having a theoretical framework.

The study found that the inadequate legal framework and poor enforcement in Kurdistan caused the environment to be more vulnerable to exploitation by oil and gas companies. They took advantage of these "loopholes" to justify their disregard of natural resources including water, to gain more profit. Thus, the study not only recommended the revision of Law No. 22 (2007) to include stringent provisions to concentrate on the protection of the environment, but also suggested that a new comprehensive law with stricter implementation to be legislated to prevent pollution of the environment by the oil and gas industries. In addition, these companies should be compelled to pay tax as well as provide funds and fair compensation for any inevitable environmental consequences.[128]

[127] Arez Mohammed Sediq Othman, "Legal and Ethical Obligations of Oil Companies in Preserving Natural Environment; a Case Study of the Kurdistan Regional Government's Production Sharing Contracts", *Journal of University of Human Development* 2, No. 4 (2016): 390–98, https://doi.org/10.21928/juhd.20161225.15.
[128] Ibid., 397-398.

Although the study attempted to analyze the legal and ethical obligations of oil and gas companies in respect of the protection of the environment in Kurdistan, it did not comprehensively analyze the pertinent legal framework. For instance, the study did not focus on the role of the main legislation on environment, namely Law No. 8 (2008) for Environment Protection and Improvement in Kurdistan Region of Iraq. It also did not adequately analyze the other factors that pose a risk to the destruction of the environment such as industrial, agricultural, municipal, and household wastes. Furthermore, the study did not specifically examine the legal rules and regulations for preserving rivers from harmful oil activities. Hence, these gaps are discussed as a scope of the current study.

A study in 2017 illustrated that the Qlyasan Stream, Tanjero River, and Darbandikhan dam are mainly used for irrigation purposes while continuously being exposed to unbelievable pollution.[129] The study further found that industrial projects producing fertilizers for farming land may have contributed to the increase of radioactivity levels in the water resources. It was also pointed out that the marine ecosystem polluted by radioactivity could transfer the radioactive doses found in the surface and ground water via the consumption of the water or fish and ingestion of terrestrial biota cultivated using the polluted water.

The 2017 study mentioned above showed that Iraq including Kurdistan had encountered unprecedented water pollution, especially in rivers. The Tanjero River pollution is a clear example that threatens the water resources of the whole of Iraq.

[129] Ahmed I. Khwakaram, "Monitoring of Radioactive Background in Qlyasan Stream, Tanjero River and Derbendikhan Lake in Sulaimani Governorate/Kurdistan Region-Iraq", *Journal of Zankoy Sulaimani - Part A* 19, No. 2 (2017): 109–14, https://doi.org/10.17656/jzs.10616.

Thus, as mentioned in the previous literatures, the legislative protection of rivers still has shortcomings and limitations which need to be addressed in detail through a more focused legal study.

Therefore, based on the problem statement and gap in literature, this current study sets out to examine the relevant legislations for water pollution control and prevention in the case of rivers in the region. Law No.8 (2008) for Environmental Protection and Improvement and Law No.4 (2022) for Water Management and Protection in Kurdistan region are analyzed to answer the research questions and achieve the objectives of the study.

1.9 Gap in Literature

A review of the existing literature reveals that most of the studies conducted on the river were carried out from a scientific perspective. Some of the literature focused on the problem of environmental pollution. Others discussed water pollution in general. However, the legal researcher did not come across a study on the protection of rivers in Kurdistan from a legal perspective. There is an absence of an extensive legal study on river contamination based on a combination of the doctrinal and socio-legal methods, adopting the qualitative method namely interviews as an approach to collect data.

1.10 Outline of Chapters

Based on its objectives, this thesis is divided into six chapters. Chapter One addresses the general view of the study, including the background of study, problem statement, research questions, research objectives, significance of the study, research

methodology, limitation of the study, literature review, outline of chapters, and conclusion. Chapter Two presents the concepts of river protection and international legal framework, which include some discussion on the concepts and definitions of some relevant terms such as sustainability and the 17 sustainable development goals cited under Agenda 2030 by the United Nations, international framework on river protection, right to a safe environment and right to access clean water under Iraqi constitution. Chapter Three reflects objective one of the study which is about the legal framework and protection against river pollution in Kurdistan. Meanwhile, Chapter Four is dedicated to objective two, i.e., the discussion of the institutional framework by analyzing the role and responding of Environmental Board and other relevant institutions towards river pollution prevention. Chapter Five covers objective three i.e. to analyze the enforcement mechanism for the protection against river pollution in Kurdistan by relevant government agencies. Lastly, Chapter Six provides several recommendations for improving the existing legal framework for controlling and preventing the rivers pollution in Kurdistan.

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1.11 Conclusion

This study, which combines the doctrinal and socio-legal (non-doctrinal) approach, attempts to analyze the problem of river pollution in the Kurdistan Region of Iraq. A qualitative approach is used through a careful examination of the contents of current laws and the legal framework regarding river pollution control and prevention. This study focuses on the environmental legislations regarding river protection to examine the legal framework, the adequacy of the law, institutional arrangement, and the enforcement mechanisms to highlight legal lacunae and weakness in case of river pollution in Kurdistan region.

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CHAPTER TWO

THE CONCEPTS OF RIVER PROTECTION AND INTERNATIONAL LEGAL FRAMEWORK

2.1 Introduction

This chapter is dedicated to the conceptualization of the study. It includes discussing all the relevant and necessary definitions of terms used throughout the dissertation, the concepts, and international frames. Therefore, this chapter takes into account the general basis of the study.

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2.2 Operational Definitions

This study attempts to briefly clarify the meaning and definition of some terms and concepts relevant to the scope of the study. The definitions are pointed out below:

2.2.1 Pollution

The term "pollution" has been defined in most dictionaries. Understanding of the term assists in understanding the concept of pollution. For instance, the Collins Dictionary states:

> "Pollution is poisonous or dirty substances polluting the water, air, or land somewhere".[130]

Meanwhile, the Cambridge Dictionary simply defines pollution as: "Damage caused to water, air, etc. by harmful substances or waste".[131]

Although the principles of the 1972 Stockholm Declaration[132] and the 1992 Rio Declaration[133] emphasize preventing pollution to protect the environment, there is no explicit definition of the concept of pollution.[134] Among the most precise definitions of water pollution is the one in Egyptian Law No. 124 of 1983 for fishing and aquatic life, as stated in the first Article:

> "Water pollution changes the properties of natural, chemical and biological waters as a result of throwing or leaking foreign materials such as oils and their derivatives or chemical wastes, organic and inorganic. And insecticides or sewage residues in the Egyptian waters, which result in harm to the water wealth or public health."[135]

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[130] "Pollution Definition and Meaning | Collins English Dictionary." n.d. Www.collinsdictionary.com. https://www.collinsdictionary.com/dictionary/english/pollution.
[131] Cambridge Dictionary, "Pollution | Meaning in the Cambridge English Dictionary." Cambridge.org, accessed October 16, 2019. https://dictionary.cambridge.org/dictionary/english/pollution.
[132] Vlasin, Raymond D., "United Nations Conference on Human Environment." *Journal of the Community Development Society* 4, no. 1 (March 1973): 22–28. https://doi.org/10.1080/00103829.1973.10877486. See principle No. 7.
[133] "Rio Declaration on Environment and Development." 1992. *Environmental Conservation* 19, no. 04 (December): 366. https://doi.org/10.1017/s037689290003157x.
[134] Marie-louise Larsson, "Legal Definitions of the Environment and of Environmental Damage", *Stockholm Institute for Scandianvian Law*, 2009, 156–76.
[135] Ahmad Abdul Karim Salama, *Environmental Protection Law- In Arabic* (Cairo: Dar Al-Nahda Al-Arabia, 2008), 110-112.

However, there have been some international efforts to define pollution in terms of its technical and terminal meaning. The documents of the Organization for Economic Cooperation and Development for Europe (OECD) states:

> "Pollution is the direct or indirect introduction of human beings of materials or energy into the environment, which entails harmful consequences, in a way that endangers human health, harms vital resources and ecosystems, and undermines the values of enjoying the environment, or hinders other legitimate uses of the medium."

The OECD definition is the more usable definition in the legal field.[136] Moreover, the United Nations defines pollution as: "1) Presence of substances and heat in environmental media (air, water, land) whose nature, location, or quantity produces undesirable environmental effects, and 2) Activity that generates pollutants."[137]

All the definitions emphasize damage to the natural quality of water, air, and land. Meanwhile, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq defines environmental pollution as:

> "Any direct or indirect changes in the environmental components or properties that lead to its damage and distort its normal balance."[138]

2.2.2 Water pollution

In accordance to the UN, water pollution is defined as:

[136] Ibid., 111.
[137] Statistics Division Department for Economic and Social Information and Policy Analyses, "*Glossary of Environment Statistics*" (New York: UN, 1997), https://unstats.un.org/unsd/publication/seriesf/seriesf_67e.pdf.
[138] See Chapter One (Goals and Definitions), Article 1, Para 9, Law No. 8(2008).

> "The presence in water of harmful and objectionable material – obtained from sewers, industrial wastes and rainwater run-off – in sufficient concentrations to make it unfit for use."[139]

In addition, understanding marine pollution might be useful for defining water pollution. To illustrate, the United Nations Convention on the Law of the Sea 1982 defines marine pollution as:

> "The introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human health, a hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for the use of seawater and reduction of amenities."[140]

Meanwhile, water pollution has been defined in a way that includes all types of water pollution. For instance:

> "Any physical or chemical change in water quality, whether direct or indirect, negatively affects living organisms, or makes the water unhealthy for the required uses."[141]

In addition, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq does not provide any definition of water pollution. Meanwhile, the new Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq provides definition for water-related terms such as "water

[139] Ibid.
[140] UN, "United Nations Convention on the Law of the Sea" 1982, https://www.un.org/Depts/los/convention_agreements/texts/unclos/unclos_e.pdf.
[141] Mohammad Hassan Ewaz and Hasan Ahmed Shahata, *Environmental pollution danger threat live - In Arabic* (Cairo: Dar- Al-Arabia lilkitab, 2nd edition, 2014), 145.

pollution, water resources, treated water, water management, heavy water, beneficiary etc.". For instance, water pollution is defined as:

> "Any process that causes a change in water criteria and its main ingredients in a way that damages human life, living organism and the environment."[142]

Based on the definition, water pollution occurs when changes happen in the water criteria and main ingredients due to human or natural factors. Here, a question arises about the definition provided by the new water law: Is the water considered polluted if damage is not proven? According to the definition, it should cause damage to humans, living creatures and the environment.[143]

2.2.3 Inland water pollution

To narrow down the scope of the meaning for water pollution, it is crucial to define inland water pollution, which can be briefly defined as:

> "Inland waters are fresh waters such as creeks, rivers, wetlands, lakes and groundwater systems, but also include brackish and saline bodies of water."[144]

Therefore, inland water pollution occurs in two ways:[145]

[142] Para 17, Article 1, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[143] But due to lack of modern scientific means or technology in the region, sometimes such damage may not be proven. Hence, the study believes that it is better to not relate the occurrence of water pollution to the damage caused, since change in the natural criteria may not cause damage in the short term. Therefore, water pollution may occur due to natural factors or by human made factors such industrial, municipal, sewer, medical and agricultural wastes, among others, which cause water quality deterioration or change in water criteria or ingredients and of which may affect living organisms directly or indirectly. However, the new water law does not include any specific forms of water pollution such as inland water pollution or river pollution.
[144] Likens, G. E. "Inland Waters." *Encyclopedia of Inland Waters* (2009): 1–5. http://dx.doi.org/10.1016/b978-012370626-3.00001-6.
[145] Marstrand, Pauline K. "Pollution of Inland Waters." In *Environmental Pollution Control*, 89–104. Routledge, 2019.

i. By pollutants being applied anywhere within the area of the land that forms their drainage basin or watershed, or

ii. By direct disposal or discharge into the water body.

Based on that, river pollution is categorised under inland water pollution due to various human activities which cause industrial, agricultural and household wastes to be discharged into rivers directly or indirectly.

2.2.4 River pollution

This study focuses on river pollution, which is simply defined as:

> "The direct or indirect human alteration of the biological, physical, chemical or radiological integrity of river water, or a river ecosystem."[146]

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Although the new water law does not provide a particular definition for river or inland water pollution, river pollution may be understood from the definition of water pollution stated above, which occurs when any change happens in the water criteria or its natural ingredients.

2.2.5 Water resources

Water is a valuable resource distributed widely on the planet, which plays essential roles for the survival of all organisms and the ecosystem.[147] Although more than 70%

[146] Landy, M., *Environmental Impact Statement Glossary*. A Reference Source for EIS Writers, Reviewers, and Citizens, (IFI/Plenum Publishing Corporation, New York, 1979), 17.

[147] Taikan Oki and Shinjiro Kanae, "Global Hydrological Cycles and Freshwater Resources Freshwater", *Science* 313, No. 5790 (2006): 1068–73, https://doi.org/10.1126/science.1128845.; Igor A. Shiklomanov, "World Water Resources; A new appraisal and assessment for the 21st century", *UNESCO*, 1998.

of the Earth's surface is covered by water, only about 2.5% is fresh water, which is largely inaccessible as most of it is stored in glaciers.[148]

Since fresh water is limited, which is less than one percent, surface water resources are crucial for human and other creatures' life on earth. Rivers and lakes fundamentally support the entire ecosystem's function. However, pollution due to anthropogenic factors causes our rivers to face an unprecedented situation, thus posing threats to human beings. It is expected that the growing demand for water resources and climate change consequences would affect the availability of water for millions of people worldwide. Therefore, urgent initiatives by local and international communities are needed to cope with the challenges and to provide safe water for everyone.

However, water pollution has become one of the most crucial environmental issues facing us today. Due to the consequences of urbanization and industrialization, many countries worldwide suffer from various types of water contamination.[149] The world's wastewater is dumped, largely untreated, back into the environment, thus polluting rivers, lakes, and oceans, killing people and becoming more dire than wars or other types of violence.[150] Based on reports by the UN, more than 80 percent of wastewater globally is still being discharged directly into rivers and seas without being treated or reused.[151]

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[148] Ibid.
[149] National Research Council. *River Science at the U.S. Geological Survey*. Washington, DC: The National Academies Press,2007, https://doi.org/10.17226/11773.
[150] Denchak, Melissa. "Water Pollution: Everything You Need to Know." *NRDC*. Accessed November 14, 2019. https://www.nrdc.org/stories/water-pollution-everything-you-need-know.
[151] UNESCO World Water Assessment Programme. *The United Nations World Water DevelopmentReport: Valuing Water*. Paris: UNESCO, 2021. https://unesdoc.unesco.org/ark:/48223/pf0000375724

Water resources are mainly divided into surface and ground water. Surface water resources are water that visibly exists. It is mainly the result of overland runoff of rain water. However, it may also originate from groundwater through the processes of infiltration (from surface water to groundwater) and seepage (from groundwater to surface water).[152] Thus, surface water includes two groups of water bodies:

i. Water courses such as rivers, canals, estuaries and streams.
ii. Stagnant water bodies such as lakes, reservoirs, pools, tanks, etc.

The first group of water bodies contains conveyance links, while the second group consists of storage media. Together, they add up to become a surface water system.[153]

2.2.6 Water management

Water resource management is defined as: "The whole set of technical, institutional, managerial, legal and operational activities required to plan, develop, operate and manage water resources."[154]

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Furthermore, the new Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq comes with a definition of water resources management compared to Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq. Thus, the new water law defines water resources management as:

[152] Savenije, *Water Resources Management Concepts and Tools*, 27.
[153] Ibid.
[154] H.H.G. Savenije, *Water Resources Management Concepts and Tools* (The Netherlands: Delft, 1996), 3, accessed November 23, 2022, https://www.ircwash.org/sites/default/files/210-96WA-17543.pdf

> "Organized process that causes the sustainable and proper utilization of water resources in terms of quantity and quality for all beneficiaries."[155]

Based on that, the river management process includes some interconnected activities that are necessary to develop efficient protection for water resources, including rivers. In particular, as mentioned by the definition above, proper river management should be based on a comprehensive legal frame to shape an effective system for river management. Therefore, river management should be reformed towards more sustainability, because sustainable river management is the key to preventing river pollution due to human activities.

2.2.7 River basin

River basin is considered a significant element of water resources management, especially for countries that rely on surface water. A river basin can be defined as "a geographical unit within which water flows naturally towards a common outlet. The term river basin is generally used for the entire basin that drains into a sea, an ocean, or an inland lake".[156]

Therefore, river protection is related to the river basin. Thus, it is vital to understand the meaning of river basin to provide better river protection and clarify the responsibilities towards river protection from anthropogenic factors that damage the river basin.

[155] Para 11, Article 1, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[156] H H G Savenije and A Y Hoekstra, "Water Resources Management", *Water Resources Management* I (n.d.). In: Knowledge for Sustainable Development: An insight into the Encyclopedia of Life Support Systems, Vol. II, UNESCO Publishing, Paris, France / EOLSS Publishers, Oxford, 2002, pp. 155-180.

2.2.8 Integrated river basin management (IRBM)

IRBM is a subset of Integrated water resources management (IWRM). It shows how IWRM is applied at the national or international level across borders at the river basin scale. IRBM is defined as:

> "an integrated and coordinated approach to the planning and management of natural resources of a river basin, one that encourages stakeholders to consider a wide array of social and environmental interconnections, in a catchment/watershed context."[157]

IRBM is different from multi-purpose traditional resource management as it addresses a wider set of issues such as social impacts, varying social values and ecosystem functioning. IRBM proposes compromising of a full array of physical, biological and socio-economic variables contribute to managing a hydrologic region for ecosystem benefits and human use.[158]

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2.2.9 Integrated water resources management (IWRM)

IWRM as a process promotes the coordinated development and management of water, land and related resources in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.[159] This definition was introduced by the Technical Committee of the Global Water Partnership in 2002 during the Johannesburg World Summit on Sustainable Development.

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[157] Bruce P. Hooper, *Integrated River Basin Governance, Learning from International Experiences* (London: IWA Publishing, 2005), https://www.iwapublishing.com/sites/default/files/ebooks/9781780402970.pdf

[158] Ibid.

[159] El Rahi, Helene Jazi. "Integrated Water Resources Management: A Tool for Sustainable Development." *Future Engineering Journal* 2, no. 1 (2021): 1–13. https://digitalcommons.aaru.edu.jo/cgi/viewcontent.cgi?article=1014&context=fej.

IWRM is essential in developing a sustainable management system for rivers as the main reliable surface water resource for acquiring fresh water. This is because such a management system takes into account interrelations across different sectors, while the traditional management system is not concerned about this holistic approach. A comprehensive definition of IWRM is still open for debate. Interestingly, based on the Global Water Partnership, the key concepts of IWRM include the following:[160]

i. Multiple uses: Water is a resource for drinking and washing, but is also necessary for livelihoods.
ii. Holistic management: Both the supply of and the demand for water should be considered when creating management strategies.
iii. Multiple perspectives: Water is an economic, social and environmental good.
iv. Participatory approach: Local communities must help make decisions about their resources.
v. Women involvement: The role of women in collecting, distributing and managing water must be recognized.

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Therefore, IWRM is somehow relevant to the concept of the study, because understanding the meaning and content of IWRM is needed to improve the existing management of rivers. Thus, river policymakers should attempt to understand IWRM to enable the successful governance of rivers. Sufficient legal framework is fundamental to develop comprehensive management of water resources, including rivers.

[160] Ibid., 5.

2.2.10 The concept and definition of administrative penalty

The term 'administrative penalty' is used by legislature, scholars, and courts to describe sanctions imposed by the administrative authority on anyone without relying on prior relationships, such as contracts, or those imposed because of disciplinary rules such as employees of the government.

However, the legislature and courts do not propose specific terms for an administrative penalty to distinguish it from other sanctions imposed by the administrative institution based on contracts or disciplinary rules such as sanctions upon government employees. Therefore, some scholars attempted to propose a new term namely "Public Administrative Penalties".

The public administrative penalty is a more appropriate term to describe sanctions imposed on anyone without having previous relations, such as contracts or government employees. The term 'public administrative penalty' was proposed by the Egyptian legal scholar Dr. Mohammed Bahi Abo Yuns, who stated:

> "It is described as a public administrative penalty, because it is not applied to specific groups of people. The administration institution has the authority to impose these sanctions on everyone who violated the relevant legal texts or administrative decisions; it does not depend on special relations that connect the administration authority with those people." [161]

[161] Mohammed Bahi Abo Yuns, *Judicial Censorship on Legitimacy of Public Administrative Penalties- In Arabic*, (Alexandrea: Dar Al Jamya Al jadeda, 2000), 7. Cited by; Nasir Husain Al Ajami, *Public Administrative Penalties in Kuwait Law and Others - In Arabic*, (Cairo: Dar Al nahda Al Arabia, 2010), 24-25.

Based on that, public administrative penalties are more preferable than just administrative sanctions because they are clearer and more understandable than other terms.[162] Thereby, the study endorses Abo Yuns' term "Public" to declare that these sanctions might be applied by the administration authority on every person without any specific relationships, which clearly differs from other sanctions imposed by the administration authority based on previous contractual relationships or employees.

In addition, the administrative penalty has been defined by scholars as:

> "A penalty imposed by the administration or independent administrative authorities (Committee, Council, Authority) on individuals or institutions without interference by the judiciary as a result of their committing a violation, assault or offense against an interest protected by the legislator, to protect the public interest, the economic system, or the public order."[163]

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Furthermore, an administrative penalty has specific features. For example, it is imposed by the administrative authority instead of the court, it is not dependent on any legal relations for the administrative authority to impose it, and it is considered a public penalty, which means it is not imposed on special groups of people.[164] Therefore, to reach sustainable development, a public administrative penalty is a crucial tool to prevent or control water pollution including river pollution, if properly enforced by the local authorities,

[162] Nasir Husain Al Ajami, 25.
[163]Musa Mustafa, "Administrative penalties in the face of classified establishments harmful to the environment and the supervision of the administrative judiciary in France on them", *Journal of Right for Legal and Economic Research- In Arabic*, First issue, 2004, 13.
[164] Ibid.

2.3 Water and Sustainable Development

Understanding the concept of sustainable development is pertinent to developing a successful river management system. Protecting natural resources, including water resources, is crucial to attaining sustainable development objectives. Therefore, river protection requires the adoption of the SDGs and strategies in the river policy development process.

Hence, it is crucial to clarify the meaning and concepts of sustainability in the study of river pollution. This study discusses the definition and concepts of sustainable development from different perspectives to enrich the findings and incorporate sustainability within river management to prevent and control river pollution.

2.3.1 The Concept and Definition of Sustainable Development

Population growth, urbanization and rapid industrialization have severely contributed to the rising demands for natural resources for the purpose of socio-economic growth. However, water pollution has now become a planetary threat.[165] Understanding the concept of sustainability is extremely crucial to ensuring the survival of human beings on the planet. This concept has been interpreted by experts from various perspectives, including ecological, economic, agricultural, and social well-being.

The central point of all the definitions of sustainability is intergenerational equity. The World Bank (WB) stated that "sustainable development requires maintenance of the

[165] Fuller et al., 541.

environmental and human resource base that is essential for long-term economic growth".[166]

Sustainable development was officially defined for the first time in 1987 by the Bruntland report under the title "Our Common Future", linking economic development with environmental preservation. The report defined sustainable development as: "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs."[167]

Following this report by the commission, the term 'sustainability' became well known, especially among policymakers and environmentalists worldwide. Environmental preservation institutions were established in many countries based on the legal frameworks and authorities to protect the ecosystem through monitoring economic activities, examining the extent of sustainability, and applying environmentally-friendly technologies.[168]

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Several global efforts have conveyed a clear understanding of the concept of sustainability and how to apply it in national planning through certain international conventions, such as the Rio Summit in 1992.

[166] Lee 1985, cited by: George Foy, "Economic Sustainability and the Preservation of Environmental Assets", *Environmental Management* 14, No. 6 (1990): 771–78, https://doi.org/10.1007/BF02394171.
[167] Brian R. Keeble, "The Brundtland Report: 'Our Common Future'", *Medicine and War*, vol. 4, 1988, https://doi.org/10.1080/07488008808408783.
[168] Swati Kwatra, Archna Kumar, and Prateek Sharma, "A Critical Review of Studies Related to Construction and Computation of Sustainable Development Indices", *Ecological Indicators* 112, No. December 2019 (2020): 106061, https://doi.org/10.1016/j.ecolind.2019.106061.

In 1992, the United Nations Conference on Environment and Development (UNCED), namely the "Earth Summit" was held in Rio de Janeiro, which became another stepping stone towards adopting the concept of sustainability. The Rio Declaration includes 27 principles to guide the UN member states in accomplishing sustainable development; it recognizes the right to development while preserving the ecosystem for future generations, guaranteeing intra- and inter-generational equity.[169] It is crucial to mention some of the significant principles of the Rio Declaration, starting with Principle One, which states:

> *"Human beings are at the center of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature."*

This principle emphasizes that the right to development should take into equal consideration environmental protection and development for the present and next generations.[170] It asserts that preserving the ecosystem and development are inextricably linked to achieving sustainable development.[171]

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The Rio Declaration highlights poverty eradication as a vital element for achieving sustainable development, and that it should entail cooperative efforts between citizens and governments to enhance or provide a better life standard for all.[172] The declaration proposed that to accomplish sustainability or a higher life standard for all, people should eliminate unsustainable production and consumption patterns.[173] Thus, poverty

[169] "Report of the United Nations Conference on Environment and Development – Rio Declaration on Environment and Development", UNCED.
[170] Principle No. 3 of Rio Declaration on Environment and Development.
[171] Principle No. 4.
[172] Principle No. 5.
[173] Principle No.8.

eradication is at the heart of the 2030 sustainable development goals agenda, as it is the main obstacle to attaining sustainable development.

In addition, the concept of sustainable development focuses on establishing a new stage of economic growth in which present and future needs are taken into consideration based on the productivity of our ecosystem to sustain natural resources.[174] One of the most obvious and significant features of the sustainable development policy is the concept of protecting natural resources for the next generation, which differs from the conventional environmental policy. It also attempts to internalize the externalities of ecosystem destruction. The general goal of sustainable development is the long-term stability of the economy and ecosystem; this can be accomplished by combining and acknowledging economic, environmental, and social concerns within the decision-making process.[175]

There have been many debates about the term 'sustainability' and its concepts, especially between those who accept the three pillars of economy, society, and environment and those who believe that sustainability is the correlation between humans and nature. Some argue that "the concept is now more open to individual, political and philosophical interpretations than to scientific definition". [176]

[174] Keeble, "The Brundtland Report: 'Our Common Future'".
[175] Rachel Emas, "The Concept of Sustainable Development: Definition and Defining Principles, Florida International University", *Brief for GSDR 2015*, 2015, https://s3.amazonaws.com/academia.edu.documents/43652555/5839GSDR_2015_SD_concept_definition_rev.pdf?response-content-disposition=inline%3B filename%3DThe_Concept_of_Sustainable_Development_D.pdf&X-Amz-Algorithm=AWS4-HMAC-SHA256&X-Amz-Credential=AKIAIWOW.
[176] John Morelli, "Environmental Sustainability: A Definition for Environmental Professionals", *Journal of Environmental Sustainability* 1, No. 1 (2011): 1–10, https://doi.org/10.14448/jes.01.0002.

Although the word 'sustainability' has been used for a variety of purposes as a buzzword, some efforts have been made to clarify the real concept of sustainability in different professions (as mentioned earlier) such as "ecological", "economical" and "agricultural". Therefore, defining each component of sustainability distinctly may be useful in organizing the actions towards achieving global sustainability in real life.

2.3.2 Ecological approach of sustainability

The ecological approach of sustainability "requires safe minimum standards of environmental assets as constraints on the efficiency criterion in order to ensure the sustainability of economic systems".[177] The term 'ecological sustainability' has been defined as a useful concept for protection biologists. In "Ecological Sustainability as a Concept of Protection", the definition of ecological sustainability links human needs with the ecosystem, which is "meeting human needs without compromising the health of ecosystems".[178]

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Thus, ecological sustainability is meant to protect the biota of ecosystems that are inhabited by human beings and exploited for economic purposes. Based on this, ecosystem health arises as another relevant conservation concept. The concept of ecological sustainability is hence, maintenance in the same place at the same time, of human economic activities and ecosystem health. In short, the complete approach to conservation biology should include both biodiversity protection with ecological integrity and sustaining ecosystem health.[179] Therefore, ecologists will attempt to

[177] Foy, "Economic Sustainability and the Preservation of Environmental Assets", 775.
[178] J. Baird Callicott and Karen Mumfordf, "Ecological Sustainability as a Conservation Concept", *Conservation Biology* 11, No. 1 (1997): 231–39, https://doi.org/10.4324/9781315241951-21.
[179] Ibid, 35.

protect a minimum level of environmental assets in physical terms rather than the dollar value of a combination of natural and man-made capital.[180]

2.3.3 Economic approach of sustainability

Based on the economic approach of sustainability, economic activities should not burden the next generation excessively. Therefore, the creation of various rules for the purpose of conserving environmental assets is necessary. [181] Safe minimum levels of environmental assets constrain the efficiency criterion in order to gain sustainable economic systems. This is due to the possibility that some natural capital cannot be substituted and that there is high uncertainty of the long economic advantages of the ecosystem. It is argued that the ecological approach to sustainability should constrain the economic approach for decisions comprising the allocation of environmental assets.[182]

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In brief, the economic perspective of sustainability asserts that "current economic activity [should] not disproportionately burden future generations". Environmental assets are merely part of the value of natural and manmade capital, and their protection becomes a function of the overall financial analysis.[183]

Therefore, economic sustainability entails an analysis to minimize the social costs of meeting standards for preserving environmental assets but not determining what those standards should be.[184] The focal idea of economic sustainability is the amount of

[180] Foy, 775.
[181] Foy, "Economic Sustainability and the Preservation of Environmental Assets,", 772.
[182] Foy, 772-773.
[183] Foy, 774.
[184] Morelli, "Environmental Sustainability: A Definition for Environmental Professionals,", 2.

physical inputs provided by natural resources, including both renewable (e.g., forest) and non-renewable resources (e.g., oil) into the process of production. Meanwhile, environmental sustainability is more concerned about environmental life-support systems essential for human beings and the entire production system. [185]

These life-support systems consist of the atmosphere, water, and soil, which are fundamentally important for human life on the planet. As such, the capacity of environmental services must be preserved. Continuous destruction by human activities on irreplaceable environmental services would be incompatible with sustainability.[186]

However, the economic approach to sustainability has faced criticisms in terms of the possibilities of placing dollar values on environmental benefits, the feasibility of substituting natural and man-made capital, and the ethical grounds for utilizing efficiency as the only determinant of sharing environmental assets.[187]

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2.3.4 Social approach of sustainability

According to the Worldwatch Institute, a sustainable society can be defined as one that "satisfies its needs without diminishing the prospects of future generations".[188] Social sustainability is environmental sustainability or conservation of life support systems that are a prerequisite for the existence of social sustainability. Therefore, social sustainability refers to the eradication of poverty as the main objective of sustainable development. However, despite economic growth, poverty continues to increase

[185] Robert Goodland, "The Concept of Environmental Sustainability", *Annual Review of Ecology and Systematics* 26 (1995): 1–24, https://doi.org/10.4324/9781315241951-20.
[186] Goodland, 14.
[187] Foy, "Economic Sustainability and the Preservation of Environmental Assets", 774.
[188] Brown 1988, cited by: Foy, 771.

worldwide. Qualitative development leads to the reduction of poverty. Countries with unsustainable economies are depleting their natural resources, while countries that are sustaining themselves rather than eliminating their resources are more peaceful.[189]

Based on the above, social sustainability can be defined as "a positive condition within communities and a process within communities that can achieve that condition". This definition includes several relevant principles such as equitable access to services, equity between generations, a system of relations valuing disparate cultures, citizens' participation, especially at the local level, a sense of public ownership, a system for raising awareness, promotion to achieve social needs, and political support for the society to attain their needs.[190] Thereby, capital sustainability is a significant concern in the application of the definition of sustainable development as there are different types of capital, namely social, natural, and man-made.

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Moreover, there have been many debates between environmentalists and economists about the meaning and conceptualization of the term 'sustainability'. In its weak definition, sustainability is conceptualized as relying on the economic value principle and neoclassical capital theory, and being human-centric. It focuses on the capital value of the natural resources, while ignoring their values in terms of the natural materials and services provided by nature.[191]

Meanwhile, the stronger definition of sustainability delineates it as the reliance on biophysical principles, taking into serious consideration specific tasks performed by

[189] Goodland, "The Concept of Environmental Sustainability,", 9.
[190] Morelli, "Environmental Sustainability: A Definition for Environmental Professionals", 3.
[191] Kwatra, Kumar, and Sharma, "A Critical Review of Studies Related to Construction and Computation of Sustainable Development Indices", 1.

the environment for humans. For instance, a weak sustainable mindset will evaluate the value of a forest merely in terms of the price of the trees that have been cut down and the yield of materials from them, such as furniture or paper. Whereas a strong sustainability perspective will estimate the economic value of the forest not only in terms of the financial value of the trees, but also the environmental and social values. For example, the forest is a vital source of food production and shelter to many humans and wildlife, positively contributing to rainfall, spreading clean air, and decreasing the rate of carbon in the atmosphere, all of which are disregarded in the weak definition of sustainability.[192]

Based on the discussion above, the weak definition of sustainability depends on the philosophy that man-made or manufactured capital is more crucial than natural capital, and that natural capital can be replaced by man-made capital. In contrast, strong sustainability, which the study agrees with, believes that natural capital is vitally more important than man-made capital. Hence, a strong sustainability definition encourages the regulation of natural resource utilization, technology usage, and protection of natural capital for future generations.[193]

A weak definition can be distinguished by the opinion that only the aggregate level of capital matters, and that man-made or manufactured capital is a sufficient alternative to natural capital.[194] Therefore, this study strongly agrees with ecologists and environmentalists who support the strong definition of sustainability.

[192] Kwatra, Kumar, and Sharma, 3.
[193] Ibid.
[194] Emas, "The Concept of Sustainable Development: Definition and Defining Principles, Florida International University".

Although river pollution is linked to the ecological, economic and social approaches to sustainability, it is still critical to prioritize the ecological approach of sustainability in protecting the river ecosystem from man-made threats through the sufficient preservation of natural resources particularly rivers as valuable resources that provide countless services for humans and the flora and fauna.

As the process of globalization lacks the tools for compensating its harmful consequences, there is now an increase in economic, social, cultural, natural, and political challenges, as well as gaps between developed and developing nations. Consequently, social inequality, poverty, crises and environmental challenges are now rising at an alarming rate.[195] Notwithstanding the discussion above, the concept of sustainable development has wider objectives in different sectors. The study, hence, discusses existing international efforts to shape sustainable water management and the achievement of all the 17 SDG goals (set under the 2030 SDG agenda) by 2030.

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2.4 International legal framework on water and river protection

This study will discuss the latest international frame and plans that could be used as a guideline to improve the legal framework for sustainable water or river management. Therefore, this study highlights both the International Decade for Action "Water for Sustainable Development" which started from 2018 to 2028 and Agenda 2030 for sustainable development as the critical global efforts towards water resource protection and development.

[195] Akbar Valadbigi and Shahab Ghobadi, "Sustainable Development and Environmental Challenges," *OIDA International Journal on Sustainable Development* 2, no. 3 (2010): 23–28, https://oidaijsd.com/wp-content/uploads/2019/03/02-03-03.pdf

2.4.1 International Decade for Action, "Water for Sustainable Development", 2018–2028

The United Nations General Assembly adopted a resolution on December 21, 2016 and announced the "International Decade for Action: Water for Sustainable Development". The "Water Action Decade" was initiated on World Water Day on March 22, 2018, and will end on March 22, 2028. The main objectives of the Water Decade are to achieve sustainable development and integrated water resources management to accomplish social, economic and environmental goals, and to implement and promote relevant programs and projects.[196] Furthermore, the Water Decade supports cooperation and partnership at all levels to obtain internationally agreed water-related goals and targets, including the 2030 Agenda for Sustainable Development Goals (SDGs). The Water Decade also encourages the development of water usage efficiency, taking into consideration the nexus between water, food, energy and the environment and highlighting the participation of all relevant stakeholders including women, children, young people, elderly, persons with disabilities, indigenous people and local communities.[197]

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Based on that, Iraq, as a member state, is committed to act under the Water Decade plan to achieve its objectives and ensure a healthier river ecosystem for humans and biodiversity. Therefore, the Iraqi government, in coordination with the KRG should take the global water action plan into serious consideration towards building national water strategies and implementing all the necessary recommendations by the UN to

[196] "International Decade for Action on Water for Sustainable Development 2018-2028", 2018, accessed on September 16, 2021, https://www.un.org/en/events/waterdecade/

[197] "Water Action Decade 2018-2028", United Nations Secretary, 2018, 1–30, https://wateractiondecade.org/wp-content/uploads/2018/03/UN-SG-Action-Plan_Water-Action-Decade-web.pdf.

overcome current water challenges and improve water management in a sustainable manner.

2.4.2 Agenda 2030 for Sustainable Development

On September 25, 2015, 193 countries accepted sustainable development goals at the UNGA under the theme "Transforming Our World: The 2030 Agenda for Sustainable Development". There are 17 goals with 169 targets that should be achieved by 2030. This historic decision by the member states of the UN is to accomplish people-centered goals and targets. The UN attempts to achieve full implementation of these goals within 15 years.[198]

Poverty eradication is recognized by the UN as a global challenge towards achieving the SDGs, whereby the member states have to accomplish the SDGs within the economic, social and environmental pillars in an integrated manner. The SDGs were established based on the Millennium Development Goals (MDGs).[199]

Based on the resolution, the 15 years are devoted to ending various global crises such as poverty, hunger, and inequalities in all countries, thus creating peace, societal inclusion, respect towards human rights, gender equality and enhancement of the role of women and girls in society, and preservation of the earth and its natural resources. Besides that, the resolution aims to establish positive conditions for sustainable, inclusive and sustainable economic growth, sharing prosperity and decisive work for

[198] "Transforming Our World: The 2030 Agenda for Sustainable Development", United Nations, 2015, accessed on September 2021, https://sdgs.un.org/2030agenda
[199] UNGA.

all, taking into consideration various conditions of national development and capacities.[200]

In this resolution, the UN reaffirms all previous global efforts in progressing the concept of sustainable development and issues the 2030 Agenda, including the Earth Summit in 1992,[201] the World Summit on Sustainable Development (WSSD), the International Conference on Population and Development,[202] the World Summit for Social Development, and the Beijing Platform for Action.[203]

Apart from that, the 2030 Agenda reaffirms all the 27 principles of the Rio Declaration, particularly principle 7, which refers to the common but differentiated responsibilities.[204] Moreover, the SDGs devote specific goals and targets to water-related issues, which will be discussed in the next sub-section.

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2.4.2.1 Water and Sanitation in 2030 Agenda

Water and sanitation are vitally important for sustainable development and the 2030 Agenda and are inextricably linked to many other Goals. SDG 6 is the main goal relevant to water and sanitation. It aims to "ensure availability and sustainable management of water and sanitation for all". SDG 6 has eight targets and 11 global indicators; the targets within Goal 6 are interconnected to many other Goals.

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[200] Ibid.
[201] "Report of the United Nations Conference on Environment and Development – Rio Declaration on Environment and Development", UNCED.
[202] United Nations, "Report of the International Conference on Population and Development", *United Nations* (New York, 1995), https://www.un.org/en/development/desa/population/events/pdf/expert/27/SupportingDocuments/A_CONF.171_13_Rev.1.pdf.
[203] United Nations, "United Nations Report of the Fourth World Conference on Women", *United Nations* (New York, 1996), https://doi.org/A/CONF.177/20/Rev.1.
[204] "Transforming Our World: The 2030 Agenda for Sustainable Development."

The 2030 Agenda emphasizes on the responsibility of the member states to achieve sustainable development in its three dimensions namely economic, social and environmental in an integrated and balanced manner. Figure 2.1 shows the interconnections between these three dimensions of SDG 6.

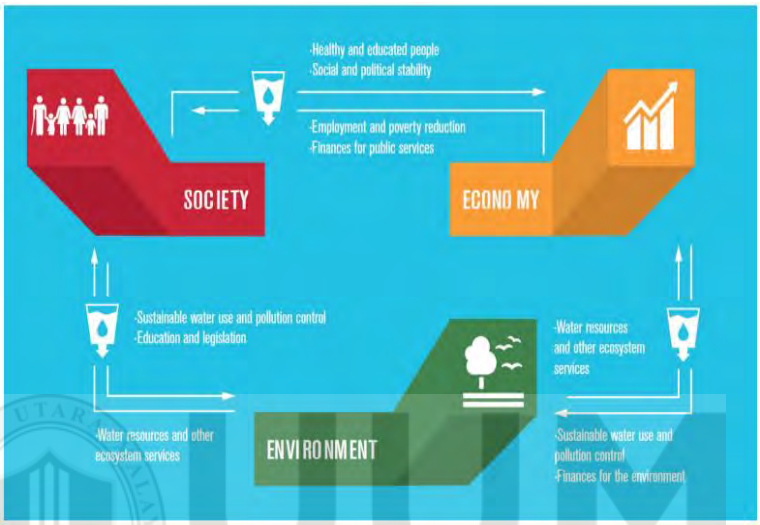

Figure 2. 1 Interrelation between the three dimensions of SDG 6
Source: (UN-Water, 2016)[205]

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Based on the analysis by UN-Water, there are positive correlations between the SDG 6 targets and the other SDG targets. For instance, if wastewater management is successfully implemented, it will improve the availability of clean drinking water, sanitation and hygiene, and ultimately decrease the risk of water-related diseases significantly. Furthermore, poverty and disparities can be eradicated with affirmative consequences on education and the economy.[206] However, there are some possibilities of conflict in view of the present condition, namely efforts to access energy which entail land and water utilization and exploitation, thus leading to more pollution.[207]

[205] Cited by; Aneta Nikolova et al., "Integrated Approaches for Sustainable Development Goals Planning: The Case of Goal 6 on Water and Sanitation", *United Nations* 3, No. September (2017): 22.
[206] Aneta Nikolova et al., "Integrated Approaches for Sustainable Development Goals Planning: The Case of Goal 6 on Water and Sanitation", 22.
[207] Ibid.

The UN-Water analysis also noted that by predicting and comprehending such trade-offs or potential conflicts, we can take steps forward in time to guarantee a balanced existence of resources throughout the social, economic and environmental development goals.[208] SDG 6 of Agenda 2030 consists of 8 correlated targets, as presented in Table2.1.

In addition, Agenda 2030 also includes other direct goals and targets that are strongly related to water protection, such as the protection of freshwater ecosystems, combating desertification (Goal 15), ensuring healthy lives for all and combating water-borne diseases (Goal 3), as well as decreasing the impacts of water-borne disasters (Target 11.5).[209]

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Table 2.1

SDG 6 and its targets

6.1	By 2030, achieve universal and equitable access to safe and affordable drinking water for all.
6.2	By 2030, achieve access to adequate and equitable sanitation and hygiene for all, end open defecation, and pay special attention to the needs of women and girls and those in vulnerable situations.
6.3	By 2030, improve water quality by reducing pollution, eliminating dumping, and minimizing the release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally.

[208] Ibid,16.
[209] United Nations Secretary, "Water Action Decade 2018-2028".

6.4	By 2030, substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity.
6.5	By 2030, implement integrated water resources management at all levels, including through transboundary cooperation, as appropriate.
6.6	By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes.
6.a	By 2030, expand international cooperation and capacity-building support to developing countries in water- and sanitation-related activities and programmes, including water harvesting, desalination, water efficiency, wastewater treatment, recycling and reuse technologies.
6.b	Support and strengthen the participation of local communities in improving water and sanitation management.

Source: Resolution adopted by the General Assembly on September 25, 2015.

2.4.2.2 Follow-up and review of the 2030 Agenda

The UN was established to follow-up and review the implementation of the 2030 Agenda. The High-level Political Forum (HLPF), the UN's main platform on sustainable development, plays a significant role in following-up and reviewing the SDGs at the international level. The platform motivates countries to review the progress of the implementation of the 2030 Agenda at the national and regional levels.[210] Likewise, the Voluntary National Reviews (VNRs) also has commitments to assist in sharing experiences and inspirations by other states and the obstacles they

[210] "High-level Political Forum on Sustainable Development", United Nations, accessed February 25, 2020, https://hlpf.un.org/

face in applying the SDGs of the 2030 Agenda. The VNRs also contribute to developing policy and institutional capacity for governments and transferring different stakeholder ideas and experiences to facilitate the enforcement of the SDGs.[211]

2.4.2.3 UN-Water Integrated Monitoring Initiative for SDG 6

The UN-Water Integrated Monitoring Initiative for SDG 6 plays a vital role in supporting states in patrolling water and sanitation issues under the framework of the "2030 Agenda for Sustainable Development" and collects data to make a report about the global water progress and achievements relevant to Goal 6.[212]

In coordination with relevant stakeholders, UN institutions, and other international organizations, UN-Water shares comprehensive and reliable information about water trends and management. As shown in Figure 2.2, to facilitate the achievement of the 2030 Agenda, UN-Water established the Integrated Monitoring Initiative for SDG 6.[213] The objectives of the initiative are to:

i. Improve methodologies and instruments to monitor SDG 6 global indicators.
ii. Establish growth awareness at national and global levels in relation to SDG 6 monitoring.
iii. Develop institutional and technical country capacity for monitoring.
iv. Collect data from member states and share it through reports on global progress towards achieving SDG6.

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[211] "Sustainable Development Knowledge Platform, Voluntary National Reviews", United Nations, accessed February 25, 2020, https://sustainabledevelopment.un.org/vnrs/ .
[212] "Monitoring SDGs on Water and Sanitation", UN Water, accessed February 25, 2020, https://www.sdg6monitoring.org/.
[213] Nikolova et al., 17.

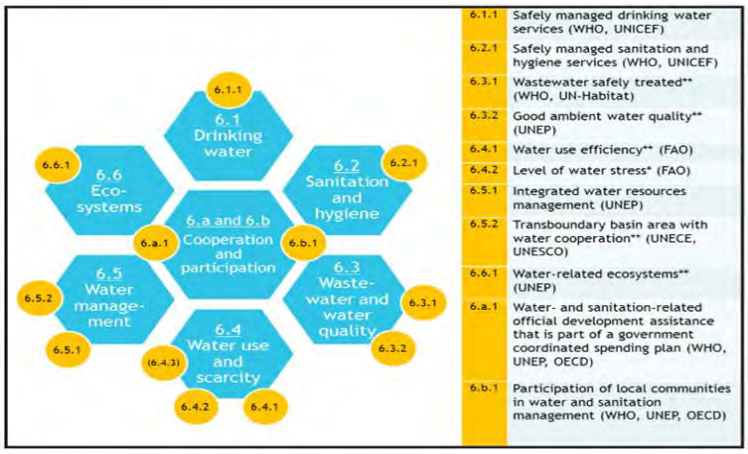

Figure 2. 2 UN-Water integrated monitoring initiative for SDG 6
Source: (UN- ESCAPE, 2017)[214]

Based on the above discussion, sustainable development has multidimensional objectives. For instance, there are interconnections between the 17 goals. Thus, it is necessary to take into account these correlations while developing water policies, especially those related to water, food and energy.

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2.5 Iraqi perspective towards SDGs

To accomplish sustainable development, effective environmental management must be practiced by the government at the international and national level, to attain such good environmental governance, it is crucial to participate different stakeholders at different levels from public, private, individual and the whole society, including rural and urban.[215] Iraq, as a member state of the UN, is a part of the 2030 Agenda; therefore, the United Nations Development Programme (UNDP), in coordination with the Iraqi Ministry of Planning (MoP) is working to integrate the SDGs in Iraq by nationalizing

[214] Ibid, 18.
[215]Haslinda Mohd Anuar, "Environmental Governance in Malaysia: An Overview," In *Proceedings of the UUM International Conference on Governance 2014*, edited by Ahmad Masum, Kamini Shanmugaiah, Mumtaj Hassan, Nazli Mahdzir, Nor Anita Abdullah, Nuarrual Hilal Md.Dahlan, Rohizan Halim, and Siti Khadijah Mohd Khair, 154–162. Sintok, Kedah: Institute for Governance and Innovation studies, UUM, College of Law , Government, and International Studies, UUM, 2014, 162.

the SDG indicators. The focus on localizing the SDG indicators will ensure Agenda 2030 is effectively incorporated into Iraq's national strategic framework , namely Iraq Vision 2030, which is designed to empower Iraq as a "safe country; create a unified society with diversified economy; and promote sustainable environment, justice, and good governance".[216]

In addition, in October 2020, the UNEP and UNDP in Iraq signed a four-year Memorandum of Understanding (MOU) intending to develop the implementation of the 2030 Agenda for Sustainable Development, particularly the environmental SDGs. The MOU identifies several key issues that the UNEP and UNDP will jointly address including "environmental policy, biodiversity and ecosystems, pollution and waste management, climate change, and supporting the Government of Iraq in its post–COVID-19 response on areas related to environmental sustainability". This collaboration between the UNEP and UNDP is significant in supporting Iraq's progress towards accomplishing the 2030 Agenda for Sustainable Development if the Iraqi government responds seriously.[217]

Although there are some concerns by the Iraqi government regarding the adoption of the 2030 Agenda for Sustainable Development, it does not seriously act to minimize water crises and other climate change impacts such as droughts and desertification,

[216] "Nationalizing the Sustainable Development Goal Indicators in Iraq", UNDP, 2021, accessed on October13, 2021, https://www.arabstates.undp.org/content/rbas/en/home/presscenter/articles/2021/nationalizing-the-sustainable-development-goal-indicators-in-ira.html

[217] "Iraq's environmental sustainability prioritized in new UNEP/UNDP agreement," UNEP, accessed October 13, 2021, https://www.unep.org/news-and-stories/press-release/iraqs-environmental-sustainability-prioritized-new-unepundp

through the development of national plans for achieving the SDGs, particularly Goal 6. A second international water conference was held in March 2022 to discuss Iraq's water challenges, organized by the Iraqi Water Resources Ministry with the participation of the UN and other experts in Baghdad.

The conference aimed to propose mechanisms to overcome future challenges of water availability, exchange scientific and policy knowledge on water resource management, support the exchange of modern technologies, and promote awareness of protection. The conference also highlighted the impacts of neighborhood water projects on Iraq's water rights, the capacity building in Iraq to improve the management of water resources and the role of international organizations in implementing Goal 6 (Clean Water and Sanitation). The Iraqi government should work actively to solve water challenges, particularly river degradation and build sustainable water management under long-term national strategies to avoid environmental and socioeconomic catastrophes due to water scarcity and other unprecedented climate change impacts.

Based on the above discussion, sustainable water management requires in-depth understanding and adoption of the concepts of sustainability into the policy-making process to overcome the anticipated water-related barriers particularly external challenges (e.g., climate change and neighborhood water projects on the Tigris and Euphrates rivers) and internal challenges (e.g., poor water management) to achieve the SDGs particularly the access to clean water for everyone by 2030. Furthermore, it is vital to provide clear legal foundation for sustainable water management, including rivers to ensure strict protection of the right to access clean water for everyone. Thus, the study attempted to discuss this issue under following sub-section.

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2.6 Protection of water resources under the Iraqi constitution 2005

Providing clean water for everyone became the subject of human rights when the right to access clean water was introduced by the United Nations in 2010.[218] The lack of access to safe, sufficient and affordable water, sanitation and hygiene services has a corresponding substantial impact on other human rights. Nowadays, water resources such as the ocean, seas, lakes and rivers have become invaluable for human survival as they are now confronted with unprecedented contamination. Humans struggle to find water for drinking, cooking, washing and farming. Failure in global efforts to provide access to water supply is a huge challenge faced by the world today.

In 2019, the WHO highlighted that 785 million people lack potable water service, including 144 million people relying on surface water like rivers. Moreover, the sources of drinking water for at least 2 billion people are polluted by feces. The WHO also indicated that 2.2 billion people were deprived of safely managed water services in 2017. By 2025, half of the world's population is estimated to face water stress.[219]

Globally, many fundamental challenges ahead must be surmounted for our ecosystem to survive, especially in connection with water resources. In addition, human activities continuously challenge and damage our nature, including rivers. Therefore, the 2030 Agenda for Sustainable Development Goals (SDGs) asserts the following:

[218] "UN World Water Development Report 2019: "Leaving no one behind", United Nations, UN WATER, March 19, 2019, accessed December 4, 2019, https://www.unwater.org/world-water-development-report-2019-leaving-no-one-behind/.
[219] "Drinking water, World Health Organization", accessed June 17, 2020, https://www.who.int/news-room/factsheets/detail/drinkingwater#:~:text=Contaminated%20water%20and%20poor%20sanitation, individuals%20to%20preventable%20health%20risks.

> "To ensure that all human beings can enjoy prosperous and fulfilling lives and that economic, social and technological progress occurs in harmony with nature".[220]

Many countries are concerned about their natural resources including water resources. The constitutional protection for water resources is crucial to warrant the right to access clean water for everyone. Since river pollution is a major environmental problem for many countries worldwide, including Iraq and the Kurdistan region, it is important to discuss constitutional conservation for water resources under the Iraqi constitution.

The Iraqi Constitution 2005 adopts a federal, parliamentary and democratic system and recognizes Kurdistan as a federal region. As a federal system, the power is divided between the central government and regional government(s). Further, Iraq has three main authorities: the parliament, the Iraqi presidency, and the central government. The Iraqi Constitution 2005 recognizes autonomy for the Kurdistan region, which is run by the Kurdistan Regional Government (KRG) in the north of the country. Regarding the political system, the Kurdistan region has three main authorities: the Kurdistan Presidency, the Parliament, and the KRG. In 1992, for the first time, the Kurds held a parliamentary election in the Kurdistan parliament to constitutionally authorize the enactment of laws to the region including the law on river protection.[221] Prior to examining the environmental laws, this closely examine the Iraqi constitution to assess

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[220] "Transforming Our World: The 2030 Agenda for Sustainable Development."
[221] Para 1, Article 117 of the Iraqi constitution states that,
"First: This Constitution, upon coming into force, shall recognize the region of Kurdistan, along with its existing authorities, as a federal region."

its environmental protection rights including the right to access clean water as a basic human right.

2.6.1 Right to Safe Environment

Environmental rights are considered a third-generation human right. The first generation of human rights include Civil and Political rights. In contrast, the second-generation rights include Economic, Social and Cultural rights, which appeared after World War II, entailing the right to work and the right to education. After the 1980s, the right to a safe environment appeared as a third-generation human right, including the right to Environment and the right to Security and Development.[222] The right to a safe environment for every human being was only mentioned in certain international conferences and conventions after World War II such as the Stockholm Declaration in 1972.[223] Following the Stockholm Declaration, 23 states adopted the right to a safe environment in their constitutions, including the right to a safe environment for flora and fauna.[224] The Iraqi constitution also recognizes the right to a safe environment and highlights the governmental responsibility to protect this human right. This matter is explained below:

(a) Iraqi Constitution 2005

The right to a safe environment is stated clearly in the first and second paragraphs of Article 33 of the Iraqi Constitution as follows:

> *"Every individual has the right to live in safe environmental conditions."*

[222] Rajab Mahmood Tahin, *Constitutional Framework for the right to the environment-In Arabic* (Cairo: Dar Al Nahda Al Arabia: 2008), 72.
[223] Jamal Mahmood Al kurdi, *The studies of Environmental Legislation-In Arabic* (Cairo: Dar Al Nahda Al Arabia, 2010), 36.
[224] Mahmood Jsim Najin Al Rashdi, *Execution Warranty to Implement environmental protection conventions-In Arabic* (Alexandria: Dar Alfikr Al Jamee, Issue1, 2014.), 63.

While, the second paragraph states that,

> *"The State shall undertake the protection and preservation of the environment and its biological diversity."*[225]

These two paragraphs show the responsibility and duty of the government to ensure the protection of environmental rights, including the right to clean water. However, the right to protect public health in Iraq is governed under Article 31 of the Iraqi Constitution. It states in the first Paragraph that,

> *"First: Every citizen has the right to health care. The State shall maintain public health and provide the means of prevention and treatment by building different types of hospitals and health institutions."*

The government is responsible for ensuring the protection of public health. The Iraqi government and the KRG have a constitutional commitment to take action in providing a healthy environment for the people by preventing environmental threats such as river pollution which leads to environmental destruction and health problems, as mentioned earlier.

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(b) Kurdistan's constitution draft

As mentioned earlier, Kurdistan is recognized constitutionally as an autonomous region under the Iraqi federal system. (Article 117). As part of the Iraqi federal system, the region should follow the Iraqi constitution. However, the region has the right to have its own legislation including the constitution. Although, the Kurdistan region does not have its own constitution, Currently, the region is drafting a constitution, which[226] mentions that the protection of environmental rights is the main task of the

[225] Iraqi Constitution 2005.
[226] Constitution of Kurdistan region still under preparation process.

government, companies and individuals. However, the draft does not include explicit recognition of the right to access clean water for everyone. The draft was also criticized because it recognizes the right to a safe environment for the citizens in Paragraph 2 of Article 57; in other words, it deprives foreigners of this right as the word 'citizen' is used instead of 'individual'. It would be better to provide this right to everyone by replacing the word 'citizen' with 'everyone' or 'every human being'.[227] Kurdistan's legislator has the legal mandate to adopt constitutional principles by regulating a legal framework to protect environmental rights. It is, hence, better to explicitly recognize the right to access clean water and sanitation in both the Iraqi and Kurdistan constitutions, due to the fact that we currently live in an era of climate change which is predicted to cause environmental destruction including water scarcity especially in Iraq. The study henceforth further explains the right to access clean water for everyone.

2.6.2 Right to clean water for everyone

Before 2010, there were indirect recognition to the right to clean water under other rights such as the right to a safe environment. But there is no such provision in the international conventions, including an explicit human right to water.[228] Only after four decades, the right to access clean water and sanitation was recognized explicitly by the UNGA as a human right i.e. on July 28, 2010. Resolution 64/292 states:

> *"The right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life and all human rights."*[229]

[227] Karzan Sadreden Ahmed, "The human right to safe environment in international and national laws; comparative study", (Master thesis, College of Law and Politic, Salahaddin University, Hawler, Iraq, 2008), 36.
[228] Ahmad, "Human Right to Water under International Law Regime : An Overview".
[229] "The human right to water and sanitation: resolution (64/292) adopted by the General Assembly," United Nations Digital Library, on 28 July 2010, accessed 2 August 2022, https://digitallibrary.un.org/record/687002?ln=en

This recognition of the human right to clean water and sanitation is a fundamental outcome of several decades of efforts. Following this resolution, some developments were made at the international and national levels. For instance, in September 2010, the Human Rights Council (HRC) issued a new resolution (Resolution 15/9) to affirm the UNGA resolution and explain that the right to clean water and sanitation is linked to the right to have adequate standards of living, which is one of the binding human rights in almost all states. Furthermore, in May 2011, the WHO approved water and sanitation rights via Resolution 64/24. Through this resolution, the WHO calls upon its member states "to ensure that national health strategies contribute to the realization of water- and sanitation-related Millennium Development Goals while supporting the progressive realization of the human right to water and sanitation".[230]

As discussed earlier, in September 2015, 193 member states endorsed this right through Goal 6 under the 2030 Agenda of SDGs, which emphasizes access to safe drinking water and sanitation for all, and clearly reaffirms their commitment to the human right to water and sanitation through the declaration of the 2030 Agenda.[231] Consequently, since 2010, some countries have developed legal frameworks to cover water and sanitation as human rights. Some other countries provided new constitutional provisions to recognize the right to water, sanitation or both such as Costa Rica, Egypt, Fiji, Kenya, Mexico, Morocco, Niger, Slovenia, Somalia, Tunisia, and Zimbabwe. Other states, such as Australia, Nepal, and Togo also issued legislation to recognize this right.[232] Courts have made decisions that confirm the recognition of

[230] "10th anniversary of the recognition of water and sanitation as a human right by the General Assembly", United Nations, July 21, 2020, accessed November 24, 2021, https://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=26116&LangID=E
[231] "Transforming Our World: The 2030 Agenda for Sustainable Development."
[232] "10th anniversary of the recognition of water and sanitation as a human right by the General Assembly", United Nations.

the right to water and sanitation by the UNGA resolution. For example, the court of appeal in Botswana mentioned the UN Resolution 64/292 and affirmed that water is a human right that is strongly connected to the rights to health and life.[233]

Some decisions by the court recognized the right to environment (which indirectly includes water rights) as part of other human rights. For instance, in the Gabcikovo-Nagymaros Case[234] (1997), Judge Weeramantry said that "[t]he protection of the environment is a vital part of contemporary human rights doctrine, for it is a sine qua non for numerous human rights such as the right to health and the right to life itself damage to the environment can impair and undermine all the human rights spoken of in the Universal Declaration and other human rights instruments".[235]

In other cases, the right to water comes under other rights such as life, liberty and personal security. For example, in the Port Hope Case[236] (1980), the complainant alleged that the dumping of nuclear wastes within Port Hope, Ontario was causing large-scale pollution of residences, thus threatening the lives of the people. Likewise, the American Commission on Human Rights has the authority to study human rights situations in the member states of the Organization of American States (OAS).[237] Its

[233] Mosetlhanyane and others v. Attorney General of Botswana. Cited by; "10th anniversary of the recognition of water and sanitation as a human right by the General Assembly", United Nations, July 21, 2020, accessed November 24, 2021, https://www.ohchr.org/en/NewsEvents/Pages/DisplayNews.aspx?NewsID=26116&LangID=E

[234] Case Concerning the Gabcikovo-Nagymaros Project (Slovakia-Hungary) Judgment of September 25, 1997, B. ICJ/692 9210707575. Mentioned by; Scanlon, John, Cassar, Angela and Nemes, Noémi, Water as a Human Right? IUCN, Gland, Switzerland and Cambridge, UK.2004, ix + 53pp.

[235] Quote from: P.M.Pevato, "A Right to Environment in International Law: Current Status and Future Outlook", RECIEL, vol. 8 issue 3 (1999), at 315. Mentioned by;
Scanlon, John, Cassar, Angela and Nemes, Noémi. Water as a Human Right? IUCN, Gland, Switzerland and Cambridge, UK, 2004, ix + 53pp.

[236] E. H. P. v. Canada, Communication No. 67/1980 (27 October 1982), U.N. Doc. CCPR/C/OP/1 at 20 (1984). Scanlon, John, Cassar, Angela and Nemes, Noémi (2004). Water as a Human Right? IUCN, Gland, Switzerland and Cambridge, 2004, UK. ix + 53pp.

[237] The OAS in 1948 in Bogotá, Colombia signed the Charter of OAS, which entered into force in December 1951. The Organization was established to achieve among its member states. Today, the

Report on the Human Rights Situation in Ecuador(1997) found that the inhabitants were exposed to toxic by-products of oil exploitation in their drinking and bathing water, which jeopardized their lives and health.[238] The court stated that "where environmental contamination and degradation pose a persistent threat to human life and health, the foregoing rights (right to life, to physical security and integrity) are implicated".[239]

Although the Iraqi Constitution does not expressly state the right to clean water, it does state that every person has the right to live in a safe environment including having access to clean water for everyone, and that the state shall guarantee environmental and biodiversity preservation.

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2.7 Conclusion

Water resources provide huge services to the ecosystem and human well-being on Earth. Human activities have caused serious water pollution, particularly on surface water such as rivers and lakes. The concept of sustainable development emerged in the 1980s as an approach for supporting the rationalization of natural resources utilization including water. The adoption of the 2030 Agenda for Sustainable Development Goals is the outcome of serious global efforts to tackle environmental degradation including water pollution. Governments worldwide has the commitment to tackle these

OAS brings together all 35 independent states of the Americas, as stipulated in Article 1 of the Charter—"An order of peace and justice, to promote their solidarity, to strengthen their collaboration, and to defend their sovereignty, their territorial integrity, and their independence." See: OAS, accessed December 8, 2021, https://www.oas.org/en/about/who_we_are.asp

[238] D. Shelton, "Human Rights and the Environment: Jurisprudence of Human Rights Bodies", Environmental Policy and Law, 32/3–4 (2002), at 161.Mentioned by; Scanlon, John, Cassar, Angela and Nemes, Noémi, Water as a Human Right? IUCN, Gland, Switzerland and Cambridge, UK, 2004, ix + 53pp.

[239] Inter-Am. C.H.R., Report on the Human Rights Situation in Ecuador, OEA/Ser.L/V/II.96, Doc. 10 rev. 1 (1997) at 88. Mentioned by; Scanlon, John, Cassar, Angela and Nemes, Noémi, Water as a Human Right? IUCN, Gland, Switzerland and Cambridge, UK, 2004, ix + 53.

unprecedented water crises. Thus, sufficient and sustainable water, including river protection in every country, is a prerequisite towards achieving the SDGs by 2030, particularly the provision of sufficient clean water for everyone as a recognized human right and the eradication of poverty which is the core of the 2030 Agenda for Sustainable Development Goals. Therefore, local government has the constitutional commitments towards any violations of the right to access clean water for all people through the prevention of any illegal acts that cause river pollution. Thus, policymakers in Iraq and Kurdistan should seriously consider these concepts in developing a legal framework for effective river protection via sustainable water resources management to mitigate climate change impacts in the region to secure intra-generational and inter-generational equity regarding natural resources utilization in particular water resources.

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CHAPTER THREE

LEGAL FRAMEWORK AND ADEQUACY OF THE LAW PROVIDED PROTECTION AGAINST RIVER POLLUTION IN KURDISTAN

3.1 Introduction

Water pollution deteriorates water quality due to human factors, which substantially influence the health system of human beings, animals and plants.[240] Iraq is located in an area facing severe water stress, with the country possessing very little of its own water resources.[241] Iraq is among the most vulnerable countries facing the effects of climate change, including high temperatures, droughts, changes in precipitation patterns and its quantity, timing and intensity, growing desertification, and sand storms.[242] To achieve the first research objective, this chapter examines the legal framework and river protection in the Kurdistan region of Iraq.

[240] Tariq Ibrahim Al dsooqi, *Environmental Security- Legal System to Protect Environment-In Arabic* (Alexandria: Dar Al- Jamia Al- Arabya, 2009), 396.
[241] Waqed H. Hassan, H.H. Hussein, Basim K. Nile, The effect of climate change on groundwater recharge in unconfined aquifers in the western desert of Iraq, Groundwater for Sustainable Development, Volume 16,2022,100700, ISSN 2352-801X, https://doi.org/10.1016/j.gsd.2021.100700.
[242] Nasrat Adamo and Nadhir Al-Ansari, Climate Change Impacts: The Middle East and Iraq in Focus, Iraqi Forms for Intellectuals and Academics, accessed November 1, 2022,https://iraqi-forum2014.com/%D9%84%D8%AC%D9%86%D8%A9%D8%A7%D9%84%D8%B2%D8%B1%D8%A7%D8%B9%D8%A9-%D9%88%D8%A7%D9%84%D8%B1%D9%8Aen/climatechangeimpacts-the-middle-east-and-iraq-in-focus/

The analysis of this chapter comprises the discussion on the constitutional frame and the legal framework of river protection through environmental legislations in the region's government (KRG). Therefore, this chapter examines the legal framework of rivers by analyzing the existing legal situation and their adequacy in controlling the pollution of rivers, which are a crucial surface water resource for people in Kurdistan region.

3.2 Water management under the Iraqi constitution

It is also crucial to look at the experiences of other countries with clear constitutional protection of water resources, including rivers, via the provision of constitutional safeguarding to the right to clean water. One example is the Egyptian constitution which, despite providing explicit recognition of the right to a safe environment,[243] has specific provisions that provide constitutional protection to the Nile River coinciding with other water resources in its 2014 modification.[244] It emphasizes the protection of the Nile River by preventing pollution and rationalizing its utilization. Article 44 states that,

> *"The state commits to protecting the Nile River, maintaining Egypt's historic rights thereto, rationalizing and maximizing its benefits, not wasting its water or polluting it. The state commits to protecting its groundwater, adopting methods appropriate to achieve water safety, and supporting scientific research in this field.*
> *Every citizen has the right to enjoy the Nile River. It is prohibited to encroach upon it or to harm the river environment. The state*

[243] Article 46 of the Egyptian constitution states that: "Every individual has the right to live in a healthy, sound and balanced environment. Its protection is a national duty. The state is committed to taking the necessary measures to preserve it, avoid harming it, rationally use its natural resources to ensure that sustainable development is achieved, and guarantee the rights of future generations thereto."

[244] Law No. 48 of 1982 concerning the protection of the Nile River and the water channels against pollution. Accessed November 24, 2021, https://www.ecolex.org/details/legislation/law-no-48-of-1982-concerning-the-protection-of-the-nile-river-and-the-water-channels-against-pollution-lex-faoc018642/

guarantees to remove encroachments thereon. The foregoing is regulated by law."[245]

From 1921 until 2005, Iraq has adopted eight constitutions. Most of the provisions are on water resources, regulating the nature of ownership and usage and preserving its public waters.

In terms of water management and its protection, the current constitution of 2005 enables the federal government of Iraq (FGI) to make water planning and policy for water resources that flow from outside of the country. Paragraph 8, Article 110 mentions that the federal authority has powers over water resources and is an issue of sovereignty:

Article 110: The federal government shall have exclusive authority in the following matters:
"Eighth: Planning policies relating to water sources from outside Iraq and guaranteeing the rate of water flow to Iraq and its just distribution inside Iraq in accordance with international laws and conventions."[246]

Based on the above-mentioned article, the Iraqi government has constitutional mandates regarding water resource planning policy. The Iraqi government must also attempt to warrant water-sharing rights to the Iraqi people from transboundary rivers that reach Iraq, such as the Tigris and Euphrates Rivers. While paragraph 7, Article 114 of the Iraqi Constitution further states that the management of internal water resources under mutual issues should be managed by both the Iraqi government and the regional governments:

[245] International IDEA, Egypt's Constitution of 2014.
[246] Article 110, Para 8.

> *"Article 114: The following competencies shall be shared between the federal authorities and regional authorities: Seventh: To formulate and regulate the internal water resources policy in a way that guarantees their just distribution, and this shall be regulated by a law."*

In addition, the new Water Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq in Article 3 states that,

> *"KRG coordinates with Iraqi federal government to: First; Water policy making. Second; making policy for water resources utilization with neighborhood countries based on international conventions and custom."*

Here, the study believes that the legislature had overlooked the constitutional arrangement for water resources policy and management since Article 110, Paragraph 8 of the Iraqi constitution authorizes the federal government to manage water resources that come from outside of Iraq. In contrast, internal water resources will be managed based on coordination between the FGI and KRG as highlighted by Article 114, Paragraph 7 of the Constitution. Thereby, it is recommended to add the word 'internal' in the first paragraph of Article 3 regarding the new water law of the region to follow the Constitution, since it states "water policy-making" which includes internal and international water policy. The study also believes that the second paragraph, Article 3 of the law clearly violates Article 110, Paragraph 8 of the Iraqi Constitution; thus, it should be removed.

Coordination and collaboration between the KRG and FGI are required in regulating the internal water policy in Kurdistan for the benefit and needs of the region's

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population.[247] However, the coordination and collaboration between the said parties are very poor. This was confirmed by respondent 4[248] from the Board as follows:

> "*There is a poor relationship between the KRG and the central government about water resources management. There is an absence of any planning and coordination in this regard. The existing relation is more personal rather than institutional."*

Despite the Iraqi Constitution's concern about water, the Iraqi government still has not properly addressed the issue of water resources. Poor and non-sustainable water management and policy planning are not workable as prescribed by the Constitution.[249]

3.3 Environmental legislations in the Kurdistan Region of Iraq (KRI)

There are different environmental legislations, some directly related to water protection including rivers; others indirectly have connections with water or river preservation. The study discussed the most relevant legislations in this regard.

(a) Law No. 8 (2008) for Environmental Protection and Improvement in the Kurdistan Region of Iraq

Law No. 8 (2008) for Environmental Protection and Improvement in the Kurdistan Region of Iraq is a basic legislation to protect the environment in Kurdistan. This law comprises 48 Articles that are relevant to different spheres of environmental issues.

[247] Bahadin, Alan, The use of water resources from the legal perspective (Kurdistan region as an example), accessed March 26, 2021, http://penus.krd/index.php/ckb/2018-04-02-19-12-28/item/1758-20210326095907?fbclid=IwAR2XOZ6FXmMwxT2HiHuOetNXpd2R2F7QaFGAB_NhOO8W4CFX5GDkA-qEuQ.
[248] Respondent 4, date of interview February 18 2021, Hawler, online interview by Google meet, Thursday, Time 8:30 Pm.
[249] Respondent 4.

The objective of Law No. 8 (2008) is to preserve, enhance, and prevent pollution in Kurdistan's environment. As stated in Paragraph 1 of Article 2:

> *"Maintaining the environment of the region, protecting, improving, developing and preventing it from pollution."*[250]

Although this provision is indispensable to highlight its objectives, it has some ambiguity as it includes some interrelated environmental terms that appear too general. It does not explicitly show the clear meaning or definitions of the terms "protecting", "improving", "developing", and "preventing from pollution". While these words should be purposively put in the provision for clarity and to avoid any repetition. However, it does not mention the water resources or river protection.

This law also emphasizes the prohibition of harmful activities or "dangerous activities" as delineated in Paragraph 2 of Article 2:

> *"Protection of nature and public health from dangerous activities and harmful works to human and environment."*[251]

This article refers to adverse consequences on human health and the environment. However, these two provisions lack clarity due to the repetition of some words in the first and second parts, such as ("nature" and "environment", "public health" and "human", "dangerous activities" and "harmful works"). Paragraph 4 of Article 2 provides the scope of environmental policy covering humanity, industrial, agricultural, urban, and tourism fields as follows:

[250] Para 1, Article 2, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.
[251] Para 2, Article 2, Law No. 8 (2008).

> *"Fourth: Making the environmental policy a part of general planning of the development in all respects (humanity, industrial, agricultural, urban, tourism fields and others)."*

This provision is a segment of the strategic planning of development in all spheres, namely industrial, agricultural, and urban inter alia in Iraq.[252] Although this provision is critical to show the government's responsibilities in protecting the environment, it is too general. Therefore, clearer and more provisions for each sector are recommended, as these sectors have fundamental impacts on the Iraqi environment, particularly in river pollution. However, the enforcement of such provisions is another barrier in Iraq. These issues will be discussed later in this study.

Other objectives include raising individual and social awareness about protecting and improving the environment. Nevertheless, this requires clear mechanisms to facilitate public participation at all levels in protecting and developing natural resources, particularly water resources such as rivers in Kurdistan. Thus, it is crucially important to revise Article 2 to make it clearer and reflect upon the latest visions of sustainable management of natural resources including rivers to achieve the 2030 Agenda of SDGs.

The Essential Principles and General Rules, starting with Article 3 clearly emphasizes the right to a safe environment for everyone:

> *"First: Each person has the right to live in a safe and perfect environment and it is the duty of all people to work for the sake of environmental protection and its perfection."*[253]

[252] Para 4, Article 2, Law No. 8 (2008).
[253] Para 1, Article 3, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.

Undoubtedly, the right to access clean water is one of the most essential human rights based on the UN resolution (as mentioned earlier). However, this right is not clearly stated and recognized in some environmental legislations, including Law No. 27 of 2009 and Law No. 8 (2008). Thus, it would be better to explicitly recognize the right to access clean water for drinking and sanitation as a human right, to obligate the government and private individuals to protect water as a valuable natural resource. Therefore, Law No. 8 (2008) needs to be revised based on the current local, regional and international environmental situations in order to modernize it and enhance its efficiency in combatting environmental challenges. The study will look further on the adequacy of environmental laws regarding river protection. Based on the report of the EPI Board for 2020 (see Table 3.1), there were fewer cases of penalization compared to registered cases in court. In other words, sanctions are not imposed on every case in court. However, as mentioned earlier, Sulaymaniyah recorded the second-highest number of environmental cases in courts in 2020, which were 125 cases.

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Table 3. 1

The Environmental Protection and Improvement Board's Annual Report of 2020

No	Governorate	Number of cases in court	Cases that were imposed with Punishment & Fines
1.	Hawler	429	**23 cases**
2.	Sulaymaniyah	125	**3**
3.	Dohok	43	**7**
4.	Garmian	2	**No case**
5.	Rapareen	56	**No case**

Source: (Environment Board, 2020)[254]

[254] Environmental Protection and Improvement Board of Kurdistan region of Iraq (EPIB), *Annual Report of 2020* (Hawler: EPIB, 2020).

Nevertheless, it is a rule that if we have two provisions or laws regarding one crime or offence, the specific law will be implemented. To illustrate, environmental offences such as waste discharges into rivers may be panelized based on Paragraph 2, Article 496 of the Penal Law No. 111 of 1969 and Law No. 8 (2008) for Environmental Protection and Improvement. Here, Law No. 8 (2008) is a specific environmental protection law that applies to the case. Moreover, based on Paragraph 1, Article 42 of Law No. 8 (2008) and Paragraph 3, Article 20 of the new water Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq, stricter punishments that come under other enforceable laws in the region can be imposed.[255] This means that if there are two or more environmental or water violation laws, the court is authorized to impose the stronger penalty.

(b) Law No. 4 (2022) for Water Management and Protection in the Kurdistan Region of Iraq

Law No. 4 (2022) for Water Management and Protection in the Kurdistan Region of Iraq was approved by the Kurdistan Parliament on June 2, 2022 and published on July 7, 2022. The law includes 24 articles.

The study notes that this law has some positive sides, since it is specific for water management and preservation in the Kurdistan region. For instance, Article 1 includes the definitions of some terms such as water resources, water resources protection, water resources management, wastes, and water pollution. Furthermore, it has some critical objectives such as managing and protecting water resources in the region to achieve the best water utilization, water resources improvement, determination of the size and types of water usage to warrant water security, preservation of the future

[255] This will be discussed later under Chapter five of the study.

generation's right, water sharing rights within the region and with federal and neighboring countries, continuous coordination and data exchange to reach a just agreement regarding the amount and types of water that comes in and out of the region, and treatment of polluted water resources.[256] Moreover, the law is created Water Council in the Region, which includes the Minister of Agriculture and Water Resources (MoAWR) as president and other members from the EPI Board, Ministry of Municipality and Tourism, and the MoAWR. Besides that, four general managers act as representatives from other ministries, namely the Ministry of Planning (MoP), the Ministry of Electricity (MoE), the Ministry of Interior (MoI), and the Ministry of Health (MoH); they can attend the council's meeting but have no voting rights.

(c) Other relevant legislations for river protection

Some other legislations related to river pollution in the Kurdistan region include the Tanjero River. This is due to the fact that river pollution, such as Tanjero River is polluted as a result of generated wastes from different sectors including industry, mineral, quarry, sewerage, municipal, medical and agricultural. Thus, these sectors have their law and regulations, which include environmental protection provisions relevant to river protection. For instance, Oil and Gas Law No. 22 (2007) in Kurdistan Region of Iraq and Iraqi Law No. 91 (1988) for the Regulation of the Mineral Investment, as oil projects and quarry activities are among the factors of river pollution in Kurdistan including the Tanjero River. Quarry activities also violate Law No. 8 of 2008 and other laws such as Law No. 10 (2012) for Forest in Kurdistan Region of Iraq, and Law No. 3 (2018) for Preventing Overtaking in Kurdistan Region of Iraq.

[256] Article 2, Law No .4(2022) for Water Management and Protection in Kurdistan region of Iraq.

Based on the above discussion, some of the laws are still enforceable. In facing the current and anticipated environmental challenges, including climate change and water scarcity, it is vitally important for the Iraqi and Kurdistan Parliaments to scale up efforts to develop the existing environmental legislations to incorporate all issues relevant to preventing river pollution among others. This is because having different laws and institutions may lead to overlapping responsibilities and cause barriers for the courts. This study will hence discuss these laws in the next sub-section while examining the adequacy of the existing laws in tackling the problem of river pollution in the region, particularly the Tanjero River. The study analyzed the sufficiency of the existing relevant legislations based on different factors or wastes that contributed to river pollution in the region.

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3.4 Environmental laws to prevent river pollution

The increasing demand for water along with the growth of population, not only puts more pressure on water resources, but also results in higher discharge of sewage, industrial and agricultural wastes, which are ultimately drained into rivers.[257]Therefore, this sub-section is divided into three points to categorise the three main wastes causing river pollution in Kurdistan. These include industrial, sewer and other municipal, medical and agricultural wastes. The study examines the adequacy of the existing legal provisions in tackling each waste to prevent regional river pollution.

3.4.1 The legal provisions to prevent industrial pollution

There is a strong relationship between trade activities and the environment because all economic-related activities rely on the environment as the main source of production

[257] Suriyani Awang, "A Water Quality Study of the Selangor River, Malaysia" (PhD thesis, University of East Anglia Norwich England, 2015), 1, accessed November 24, 2022, https://ueaeprints.uea.ac.uk/id/eprint/67083/1/Binder2.pdf

materials. However, wastes generated from production processes have significant impacts on the environment.[258] Based on data from the United Nations Environment Program (UNEP) (2022), over 400 million tons of industrial wastes comprising heavy metals, solvents, toxic sludge and so on are discharged annually into water resources worldwide. Moreover, as UNEP indicated, plastic pollution in the marine ecosystem has increased tenfold since 1980.[259]

Industrial activities generate non-hazardous and hazardous waste. Although it is difficult to estimate the size of industrial wastes globally, some countries have high amounts of it. For instance, some countries such as Canada, China, India, European Union, Japan, Mexico, Republic of Korea, South Africa, Thailand and the United States generate remarkably high rates of hazardous waste.[260]

The operation of various industries causes environmental degradation, especially industrial water waste, which is extremely dangerous as it consists of various chemical pollutants that pose health risks to humans. Polluted water can affect the human body directly through drinking or indirectly via food consumption such as fish or vegetables that are cultivated with the polluted water, or consumption of animals that drink the polluted water.[261]

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[258] Al-feel, *The legal nature of the ecosystem*, 168.
[259] "For People and Planet; The United Nations Environment Programme strategy for tackling climate change, biodiversity and nature loss, and pollution and waste from 2022-2025(MTS 2022-2025), UNEP.
[260] Khasraw Abdulla Rashid, "Environmental Implications of Tanjero Waste Disposal Site in the City of Sulaimani,", 14.
[261] Majid Raghib Al-hlo, *Environmental Protection Law in the light of Sharia-In Arabic* (Alexandria: Dar Al jamia Al jadida, 2015), 340.

However, the demand for clean water for industrial usage is continuously increasing. This is because water is a fundamental requirement for running various industries due to its chemical and physical characteristics. The industrial production process generates polluted wastewater, later discharged into nearby surface water bodies such as rivers.[262] Therefore, the impact of industrial projects should be taken into serious consideration while studying river pollution. The KRI is a wealthy region in terms of available water per person in the MENA (Middle East and North Africa) region, namely about 5800 CM/Per-Cap/Year. The rainfall rate in the region is 633 mm/year.[263] Although Kurdistan has better water resources compared to other parts of Iraq, contributes to higher rainfall, and is located upstream of Iraq's international rivers, the region is still vulnerable to water challenges since it is located in a semi-arid climate area and suffers from inefficient water usage, huge water consumption, and related wastes – in fact even higher than some wealthier countries.[264]

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Moreover, the region has a high water footprint (Table 3.2), namely the amount of water that has been used for specific human purposes, including the production of specific product(s) or service(s).[265] Water footprint is defined as "the total volume of freshwater that is used to produce the goods and services consumed by the people of the nation".[266] Table (3.2) shows that Kurdistan has 17.44 BCM/Y total water

[262] Hayder Mohammed Issa, "An Initial Environmental Assessment for the Potential Risk of the Developing Industry Impact on the Surface Water Resources in the Kurdistan Region - Iraq", *Journal of Garmyan University* 1 (2014): 35–48.
[263] Karwan Sabah Hawrami and Azad Jalal Shareef, "Turkish Virtual River in Kurdistan Region-Iraq", *European Online Journal of Natural and Social Sciences* 9, No. 3 (2020): 545, https://european-science.com/eojnss/article/view/6036/pdf
[264] "Building the Kurdistan Region of Iraq: The Socio-Economic Infrastructure", KRG Ministry of Planning and United Nations Development Programme (UNDP), no. December 2012 (2012): 1–67, http://www.mop.gov.krd/resources/MoP Files/Newsletter/SEINA-FINAL.pdf.
[265] Hawrami and Shareef, "Turkish Virtual River in Kurdistan Region-Iraq", 554.
[266] Hoekstra A. Y., and A. K. Chapagain, "Water Footprints of Nations: Water Use by People as a Function of Their Consumption Pattern," *Water Resources Management*, no. 21 (2007): 35 https://doi.org/10.1007/978-1-4020-5591-1.

footprint. The huge portion of this importing is from virtual water,[267] which compromises 56.66% of the whole water footprint in the region, while local water resources contribute 43.34% of the overall water footprint. Thus, the volume of personal water footprint is estimated to be more than 2884CM/CAP/Y, which is higher than the international standard (1240 CM/Y). The region is placed third after the UAE (3135CM/CAP/Y) and the USA (3035CM/CAP/Y).[268]

Table 3. 2

Amount of water footprint in the KRI by CM/Y

Type	Agriculture	Industry	Domestic	Imported virtual water	Total of water footprint in the KRI	Water footprint per Cap/Y
Amount of water	4.502BCM	2.05BCM	0.80BCM	9.998BCM	17.44BCM	2884CM

Source: (Hawrami, K., 2020).

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Based on the above, the industrial sector is placed second in water utilization after agriculture i.e. 2.05 BCM/Y and 4.502BCM/Y, respectively. However, as mentioned earlier, Kurdistan has a different river basin, such as the Tigris River which is sourced in the eastern mountains of Turkey and other rivers such as the Khabur, Great Zab, Little Zab, and Serwan rivers as shown in Table (3.3). Along these rivers, many industries have developed. These river basins offer an appropriate environment for developing many industrial zones, which are subject to further expansion in the future. These industries cause challenges for the rivers due to their non-compliance with

[267] Virtual water is defined as "the volume of water required to produce a commodity or service". Hoekstra and A. K., Chapagain.
[268] Hawrami and Shareef, "Turkish Virtual River in Kurdistan Region-Iraq", 556.

environmental requirements and standards. The majority of the industries discharge their wastes into the rivers without undergoing any pre-treatment process. The Tanjero River is a tangible example in this regard.

Table 3. 3

Available water resources in 2007 by rivers

Rivers	Length (KM)	Annual Water Amounts (billion m^3)	Inside the Region	Outside the Region
The Khabur	160	2.2	42%	58%
The Great Zab	392	14.32	58%	42%
The Little Zab	400	7.07	64%	36%
Serwan	384	0.7	41%	59%
Awa Spi	230	5.86	100%	0%
Total	1566	30.15	59.80%	40.20%

Source:(MoP, KRG,2011)

Iraq and Kurdistan are now facing water shortage as a result of water projects in Turkey[269] and Iran,[270] along with the impacts of climate change.[271] Therefore, industrial pollution is considered a serious challenge for rivers in the region.[272] Industrial waste contaminates water with various pollutants in accordance with the type of industry. For instance, many extractive projects affect water river quality due

[269] Arda Bilgen, "Turkey's Southeastern Anatolia Project (GAP): A Qualitative Review of the Literature", *British Journal of Middle Eastern Studies* 47, No. 7 (2020): 652–671, https://doi.org/10.1080/13530194.2018.1549978.

[270] Kamal Chomani and Toon Bijnens, "The Impact of the Daryan Dam on the Kurdistan Region of Iraq", *Save the Tigris and Iraqi Marches*, October 2016, accessed March 29, 2020, https://www.waterkeepersiraq.org/uploads/9/2/7/0/9270858/daryan_dam_en.pdf.

[271] Hannah Lynch, "Party to Paris accord, can Iraq stop climate change turning fields to deserts?" RUDAW, February 16,2021, accessed March 28, 2021, https://www.rudaw.net/english/middleeast/iraq/16022021?fbclid=IwAR3dLI98EagROIY9CQCTaFf24aQ-9uc7sVptjfUfQz1KjYebFUXmkDICnqA.

[272] Issa, "An Initial Environmental Assessment for the Potential Risk of the Developing Industry Impact on the Surface Water Resources in the Kurdistan Region - Iraq,", 36.

to land disturbance works such as quarry activities nearby Serwan and the Great Zab rivers, among others. However, surface water resources can be polluted indirectly during rain due to run-off from dumps and landfill sites. This run-off consists of huge amounts of dissolved pollutants and other contaminants such as heavy metals. This run-off might bring various other materials such as suspended solids, nutrients, pathogens and agricultural pesticides that reach the rivers.[273] The Tanjero River is a great example of such an environmental disaster.

In Kurdistan, population growth along with economic development are a noticeable cause for industrialization. For instance, in 2014, the official report illustrated that the number of industries has increased with 89 large industrial enterprises, 182 medium industrial enterprises, and about 10,400 small industrial enterprises. The Directorate of Industry in Sulaymaniyah declared that around 1,650 small and medium-sized factories are operating in the governorate apart from big factories permitted by the Ministry of Trade and Industry. The main industrial area is located southeast of the city, near the Tanjero River, comprising 900 business projects such as factories producing plastic, iron, oil, concrete block, asphalt, and other construction substances. Furthermore, a new plan has been proposed to build a new industrial area near Arbat town, but it has negative impacts on the Tanjero River if appropriate measures are not taken to prevent industrial pollution. Moreover, factories and workshops with up to 75,000,000 ID capital should be registered at the Chamber of Commerce (CoC) in Sulaymaniyah. In 2016, the CoC revealed 1,451 big projects, 1,898 small projects, and 867 entrepreneur workshops in the governorate.[274]

[273] Ibid, 38.
[274] Othman, "Environmental Health Assessment in Sulaymaniyah City and Vicinity", May (2017), 9.

This definitely brings dire consequences on the natural resources, especially the rivers. Industrial pollution also poses health risks for people as industrial wastewater is the main source of heavy metals derived from natural and anthropogenic sources such as industrial waste and fertilizers, which can remain in wastewater for a long time as it is non-biodegradable and can accumulate in human tissues thus causing various diseases.[275]

In addition, studies have scientifically proven the harmful effects of heavy metals on human health and the environment. Water contaminated with heavy metals can cause the death of aquatic life, algal blooms, habitat destruction, and other short- and long-term toxicity.[276] Furthermore, industrial areas cause higher rates of perinatal health problems, neurological defects and other congenital anomalies. Thus, toxic elements can be transmitted to human bodies in different ways such as by drinking polluted water containing heavy metals (Pb, Cr, Cu, Cd, Co and iron), or consuming vegetables grown using polluted water.[277]

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As mentioned earlier, Tanjero River has been polluted significantly by different sources such as household waste, sewerage, as well as industrial and agricultural wastes.[278] These industries discharge their wastes directly without any treatment into

[275] Yousry Sadoon Rasheed, Mahmoud Mustafa Al-Mahdawi, Mohammed Rawf Hussain, "Evaluation of Some Heavy Metals in Water Sulaimanih Governorate\Kurdistan Region-Iraq", *Systematic Reviews in Pharmacy* Vol 12, Issue 2, (Feb-Mar 2021): 165, https://www.sysrevpharm.org/articles/evaluation-of-some-heavy-metals-in-water-sulaimanih-governorate--kurdistan-region-iraq.pdf .

[276] Salih N. Majid, Ahmed I. Khwakaram, and Chalang S. H. Gado,and Bzhwen K.Majeed "Pollution Status Evaluation of Some Heavy Metals along Some Surface Water Sources by Multivariate Data Analysis at Sulaimani Governorate", *Journal of Zankoy Sulaimani - Part A* 20, No. 1 (2018): 63–80, https://doi.org/10.17656/jzs.10642.

[277] Othman, *Environmental Health Assessment in Sulaymaniyah City and Vicinity*, 2017, 37; Majid, Khwakaram, Gado, and Majeed "Pollution Status Evaluation of Some Heavy Metals along Some Surface Water Sources by Multivariate Data Analysis at Sulaimani Governorate,", 63.

[278] Majid, Khwakaram, Gado,and Majeed "Pollution Status Evaluation of Some Heavy Metals along Some Surface Water Sources by Multivariate Data Analysis at Sulaimani Governorate,", 63.

the river, thus causing an environmental catastrophe and polluting the river with various heavy metals and chemical substances. Industrial pollution also has socio-economic effects because the river is used for various purposes. The pollutants also contaminate the Darbandikhan dam, the main source of potable water for the Darbandikhan people. Pollution also kills huge numbers of fish and other marine life. Besides that, studies have proven the negative impacts of heavy metals on soil and groundwater quality in the Tanjero area.[279]

Respondent 10[280] from the WaterKeeper Organization in Sulaymaniyah mentioned that industrial wastes are one of the main factors of river pollution, particularly in Tanjero River :

> *"We have many factories and about 27 illegal oil projects which discharge their wastes directly without any treatment."*

In addition, respondent 2[281] conducted researches on the water quality of the Tanjero River. She highlighted the negative impacts of these industrial wastes on the aquatic life and human health:

> *"In our study of the Tanjero River, we found industrial wastes such as heavy metals. This waste has caused water contamination, and damaged aquatic life including killing thousands of fishes and other organic life. Although the rate of heavy metal is still low, the bio accumulation inside the body of the fish could damage it and cause diseases for people who consume the fish. Similarly, the polluted water with industrial wastes deteriorates the water quality in*

[279] Al-hasnawi, "Water Quality Index Of Tanjero River Basin Near Sulaymania City,", 8.
[280] Respondent 10, Director of Waterkeeper in Sulaymaniyah- Iraq, date of interview 27 January 2021, Time 8:00 Pm.
[281] Respondent 2.

Darbandikhan Dam, which is the main source of drinking water for people in Darbandikhan city."

She added:

"In our study, we noted some water-related diseases among residents nearby Tanjero River. We also found the negative impacts of polluted water on animals and agriculture."

Based on the discussion above, it is crucial to examine the existing legal framework in terms of industrial pollution control to indicate whether or not relevant legal provisions are sufficient for controlling river pollution by industrial wastes. This issue is discussed in the following sections:

(a) Industrial waste control under Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq

Since industrial activities are significant for every country's economic development, it has substantial environmental impacts that require special consideration by the legislature while making laws and regulations to preserve the environment and control such impacts. This study hence examines Law No. 8 (2008) for Environmental Protection and Improvement to assess its adequacy in controlling industrial pollution, particularly in the case of the Tanjero River.

Industrial projects have dire consequences on all environmental elements such as air, water, soil and other biological diversity. For instance, the cement industry, which is listed as among the 17 most polluting industries by the Central Pollution Control Board

(CPCB) has harmful impacts on air, water and soil, starting from the mining of raw substances to the crushing, grinding and other processes of cement production.[282]

Law No.8 (2008) for Environmental Protection and Improvement was issued as a basic environmental legislation to protect and improve Kurdistan's environment. This law takes into account industrial factors from its objectives as the industry sector has tremendous impacts on the environment. The Law emphasizes environmental policy as part of development planning in all sectors, including the industrial sector.[283] This means that all processes of industrial development in Kurdistan should take into account environmental preservation. It also emphasizes environmental protection and improvement within the development planning in all sectors:

> *"Second: Environmental protection and improvement must be respected in the planning processes at the level of projects, programs, and developing plans in different sectors in the region."*[284]

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Although the above provisions do not clearly refer to industrial pollution, it is indirectly included. The legislature makes it compulsory to respect environmental protection while planning to develop any sector, including the industrial sector. Although this is a good step, it remains theoretic if the legislation does not provide enough warrantee to implement its content. The study also examines some provisions related to environmental protection, notably industrial pollution.

[282] M.S.A. AL-Taay, A.H.A, Al-Assie, and R.O. Rasheed, "Impact of Bazian Cement Factory on Air, Water, Soil, and Some Green Plants in Sulaimani City-Iraq", *The Iraqi Journal of Agricultural Sciences* 49, no. 3 (2018): 463–77, https://jcoagri.uobaghdad.edu.iq/index.php/intro/article/view/118/76
[283] Para 4, Article 2, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.
[284] Para 2, Article 3, Law No. 8 (2008).

(i) Environmental impact assessment (EIA)

Chapter Five of the Law entitled "Evaluation of the Environmental Impact and Environmental Consents" includes several crucial legal tools for controlling the impacts of the industrial sector, among others.

Article 12 states that,

> *"Any person normal or moral, general, specific, mixed, or any agency, after execution of this law, perform an activity that affects the environment, must prepare a study to assess the environmental impact of activities and projects that will be constructed, then send it to the Ministry in order to make a convenient decision about it.."*

By using the word (must), it is clear that this provision makes an obligation upon every institution that practices an activity that affects the environment to prepare a study to show its impacts on the environment. This provision has several shortcomings, as it allows some projects to escape from this legal mandate. Hence, a question arises here, i.e., who decides whether the activity has an effect or not, to render this assessment under this provision? Furthermore, based on Article 12, the EIA report should include some significant requirements (Figure 3.1) to show the impacts on the surrounding environment and the ways to prevent environmental pollution.

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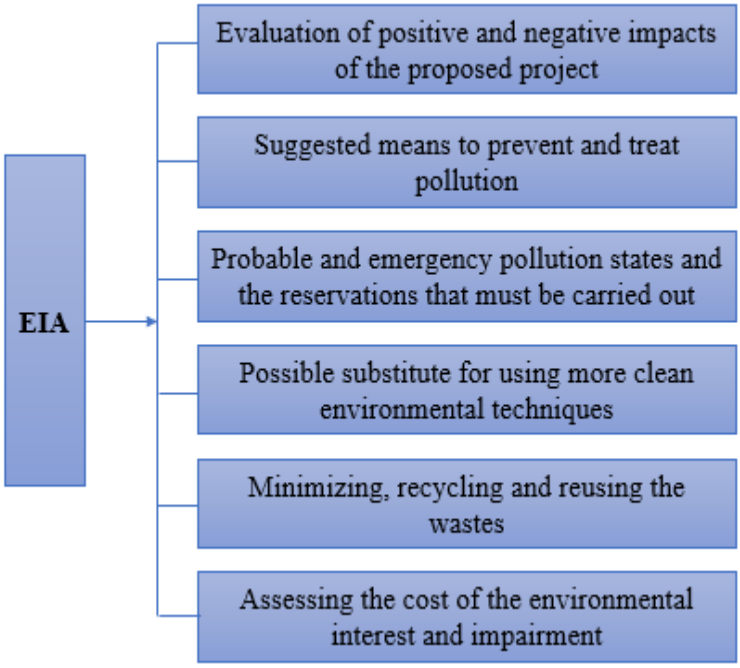

Figure 3. 1 EIA study requirements
Source: (Researcher)

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As shown in Figure 3.1 above, the institution should show the positive and negative impacts of its activities on the environment. In other words, the industry must indicate the impacts of its project on water resources if it is located nearby rivers. For example, if the project relies on groundwater, the institution should show any effects on soil and air due to industrial operations. It is not logical to convince the owner or manager of the project to illustrate the negative environmental impacts of their activity in a systematic way. Thus, in order to gain approval, the owner might minimize the negative impacts or exaggerate the positive effects.

Paragraph 2 mentioned proposing ways to prevent and treat pollution factors, based on the environmental instructions. However, there is no clear suggestion on how to prevent pollution and treat it and which instruction to use. Many industrial projects

still discharge their wastes into rivers such as the Tanjero River, without conducting any pre-treatments.[285]

Lastly, Paragraph 6 mentions the preparation of the costs of environmental harm and the benefits of the project that should be included in the study. Although this is a good move, it should be noted that the evaluation and calculation of the environmental harms and benefits of any human project are very complicated, i.e., requiring scientific and systematic assessment that should be done directly or through coordination with environmental institutions and other relevant agencies using scientific expertise, technology and experiences. However, this matter is not mentioned in the provision.

In terms of projects established before this law issuance, Article 13 authorizes the Minister of Environment (Head of the Board) to ask any industry or institution to prepare an EIA of their project if it is necessary to protect the environment. This provision is criticized because it does not oblige the Minister to request the EIA. This matter should be made an obligation instead of merely an option under the authority of the Minister.

Recently, the EPI Board issued the new instruction No. 283 on March 16, 2021 regarding the preparation of an EIA report by specific private offices or companies. The Board had set certain conditions and requirements for these private offices to prepare the report in a way that shows both the positive and negative sides of the project. This is a positive step towards developing the quality of these reports.

[285] Majid, Khwakaram, and Gado, and Majeed "Pollution Status Evaluation of Some Heavy Metals along Some Surface Water Sources by Multivariate Data Analysis at Sulaimani Governorate", 77.

However, it requires strong censorship by the Board to ensure that the EIA is accurate and sufficient based on the legal requirements and their implementation. Therefore, the EPI Board requires highly qualified experts and technical support to assess the EIA.

In terms of the role of this law in combatting environmental pollution, respondent 1 from the environmental law field[286] said:

> *"Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan is somehow a good law for protecting Kurdistan's environment. This law includes some general rules and principles to preserve all environmental elements such as air, water and soil. It has some provisions for punishing offenders. It makes EIA study compulsory for projects to show their positive and negative environmental impacts. This law also obligates the Regions' authorities to consider sustainable development to protect the future generation's right."*

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Respondent 1 also explained the legal implication of this law:[287]

> *"The legal problem of Law No. 8 (2008) EPI is that this Law includes some general rules and principles, which require issuing specific instructions to clarify the implementation of these general rules, but until now there is no such enforcement instruction."*

Meanwhile, one of the respondents[288] from the Kurdistan parliament opines that Law No. 8 (2008) requires some improvements. He said:

> *"Law No. 8 (2008) as a basic environmental law is definitely based on the time and geographic developments which need to be*

[286] Respondent 1.
[287] Respondent 1.
[288] Respondent 7, date of interview: 9 February 2021 Wednesday; Time 12:15 Am.

amended. Therefore, we had a meeting with the EPI Board about the amendment of the law. Even though this law has some positive provisions, it also has some shortcomings in terms of administration and enforcement."

He added:

"Law No. 8 (2008) should be amended in order to provide more support and power to the Board."

Similarly, respondent 6[289] , who is a parliament member, emphasized the insufficiency of Law No.8 (2008):

"Law No. 8 (2008) is problematic both objectively and formally. This law is not specific or comprehensive enough particularly regarding water quality and quantity protection. It should be amended and made better."

Apart from that, as mentioned by the study respondents, Law No. 8 (2008) requires some developments, particularly in relation to water protection from pollution, including industrial pollution. Therefore, this study discusses the adequacy of water protection within Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.

(ii) Water protection under Law No. 8 (2008) for Environmental Protection and Improvement of Kurdistan Region of Iraq

Under Law No. 8 (2008) for Environmental Protection and Improvement, water protection is regulated under Chapter One of the third portal entitled "Water Protection and Improvement", which comprises Articles 22, 23, and 24. As Article 22 states:

[289] Respondent 6, "Health, Environment and Consumer Rights Affairs Committee", date of interview: 11 February 2021 ; Time 9;00 Pm.

> *"The exertion and discharge of any harmful substances, liquid, gaseous, radioactive or thermal, into water sources or their streams is prohibited if they are not treated according to usual standards."*

Despite the statement above, this provision does not explicitly identify the standards of treatments required before discharging wastes into water resources. Furthermore, this provision does not recognize the sources of pollution, such as industrial, agricultural, household or sewer wastes. These sources carry different pollutants and consequences, requiring different legal mechanisms, but the legislature merely grouped the various wastes in one general provision. Therefore, it is better to categorize different sources of water pollution clearly, along with specific and clear legal treatments. This is because each source or factor of pollution is attributed to different sectors that require regulation independently and clearly based on precise mechanisms.

According to Article 23, different standards should be set for surface, ground and potable water by issuing special regulations:

> *"Determination of regional standards for surface, ground, and drinking water will be set by regulation."*

Despite the lack of clarity regarding the above provision, particularly in relation to "regional standards", there is thus far no action taken to determine the special standards for water resources in Kurdistan. In relation to these regional standards, respondent 4, who is the former legal expert in the Board[290] said:

> *"Law No. 8 (2008) for EPI does not regulate water resources comprehensively. It has shortcomings regarding water pollution*

[290] Respondent 4.

control as it includes three articles about water protection: Articles 22, 23 and 24. Article 22 is about water resources in general because it uses the word 'water sources', and not rivers specifically. Meanwhile, Article 23 is about setting regional standards, which means adopting standards that are applicable to neighboring countries such as Turkey and Iran. Likewise, Article 24 obligates the Ministry (Board) to issue such standards. However, even after 13 years of the issuance of this law, it is still not working out in the region."

Besides that, according to Article 24, the Ministry (replaced by the EPI Board) should, through the issuance of some regulations, determine the allowable water pollution level according to different water usage, including industrial purposes. However, such water regulations are still absent in Kurdistan. The Article states:

"The Ministry determines the measurement for the pollution level permissible in water used for drinking, irrigation, industrial purposes, and services, and returns to this measurement when needed."[291]

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Thus, there is an urgent need for different regulations to define the water measurement level of pollution for different usages such as drinking, irrigation and industrial purposes. It is also crucial to clarify the restrictions and measurements for protecting water resources from the impacts of human activities. Currently, there are no such specific measures for determining the water pollution level in Kurdistan.

Meanwhile, environmental organizations and activists call for the development of Law No. 8 (2008) to warrant water protection from anthropogenic factors. To shed light on

[291] Article 24, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.

this matter, this study interviewed several volunteers in environmental NGOs. For instance, respondent 9[292] from Kurdistan Nature Organization (KNO), a local NGOs expressed his opinion about the legal protection of water within Law No. 8 (2008):

> *"Law No. 8 (2008) was issued in 2008 following the efforts of NGOs, academics and other environmentalists at that time. I can say it was a good law for that time. However, with regards to water, we noted that this Law does not focus on water resources as one of the significant elements of the environment, such as soil, forest, illegal hunting of wildlife, and other biological diversity. It was supposed to regulate the water sector more widely and precisely in order to build a sustainable water management system that enables us to face the upcoming water challenges such as neighboring water projects by Turkey and Iran."*

Similarly, respondent 11[293] , as a legal adviser at the same NGO criticized Law No. 8 (2008) by stating:

> *"Although we do not have a specific law about rivers, Law No. 8 (2008) is about the environment including water. This law is more concerned about wildlife, forests, and projects than water protection. Law No. 8 (2008) does not mention river pollution or highlight special penalties for specific depths and types of river and water resource pollution. The Board issued Instruction No.1 (2015) about water well drilling. However, this Instruction is still inadequate as it does not include water-related issues like pollution, destruction, and change of river direction. Therefore, Law No.8 (2008) has weaknesses and shortcomings in terms of the current water situation."*

[292] Respondent 9, Director of water sector from Kurdistan Nature Organization-KNO, date of interview: 29 January 2021,Time 9:00Pm.
[293] Respondent 11, Head of the legal center of the KNO, Date of interview: 31 January 2021, Time 8:30 Pm.

Meanwhile, respondent 10[294] from the WaterKeeper (NGO) has a different perspective. He believes that environmental laws in the region are somehow better than the Iraqi environmental laws, but the enforcement is a barrier towards protecting the environment, including rivers. He stated:

> *"In my opinion, the environmental legislation in Kurdistan is better compared to the Iraqi environmental law in this regard. The problem is enforcement. We would be grateful if the KRG enforces a quarter of Law No.8 (2008). I do not need the law without enforcement."*

Respondents from the academic perspective also commented on Law No. 8 (2008). Respondent 1[295] said:

> *"The problem with Law No. 8 (2008) regarding river pollution such as the Tanjero River, in my opinion, is related to the issue that this law has general rules and principles about water including river protection, so the Board need to issue specific instructions for these rules, but we do not have such instruction yet."*

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Based on respondent 1, the absence of clear instruction by the EPI board with regards to the general rules in Law No. 8 (2008) had caused barriers for law enforcement and a poor role regarding water resources preservation in the region. The members of parliament have also been interviewed to examine Law No. 8 (2008) from their point of view. Respondent 7[296] said:

> *"Water includes a wide aspect, it is the weakness of Law No. 8 (2008) to have three articles about water protection. Although we have water resources and dams in Kurdistan, we have not used this sector to develop agriculture and other sectors. Therefore, it is advisable to have specific water laws or amend the current law."*

[294] Respondent 10.
[295] Respondent 1.
[296] Respondent 7.

From the above discussion, it is clear that Law No. 8 (2008) for Environmental Protection and Improvement is poorly regulated in terms of water protection and improvement, including protection from industrial pollution.

(iii) Law No. 8 (2008) EPI and Law No. 22 (2007) for Oil and Gas in Kurdistan Region of Iraq

The need for oil and natural gas as a major source of energy is critical for the purpose of human activity, political and economic development at the international, regional and national levels,[297] for oil-producing countries. Oil and gas industries in developing countries including Iraq and Kurdistan have caused problems across political, economic, sociocultural, legal and environmental aspects. In general, the industrial sector, particularly oil and gas industries, has contributed to environmental degradation, such as climate change and loss of biodiversity. In addition, oil and gas operations have caused pollution that threatens human health and the whole environment.[298]

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Oil refineries release about 100 chemicals every day into the environment, which cause air, water and soil pollution. Oil refinery pollution in Kurdistan is at an unacceptable range,[299] generating various harmful gases such as Sulphur dioxide (SO2), nitrogen oxide (NO2), carbon dioxide, carbon monoxide, methane, dioxins, hydrogen fluoride, chlorine, benzene and others. These gases cause human diseases, particularly for

[297] Koshesh, O. S.and. Jafari, H. R, "The Environmental Strategic Analysis of Oil & Gas Industries in the Kurdistan Region Using PESTLE, SWOT and FDEMATEL", *Pollution* 5, No. 3 (July 2019): 537–54, https://doi.org/10.22059/poll.2019.270703.549, 537.
[298] Koshesh and Jafari, 550.
[299] Karwan Dhahir Saber, "Oil Refineries in Kurdistan : A Study of Their Environmental Impact on , Humans and Their Livelihood," *International Journal of Law*, 6, No. 3 (2020), 173–177. http://www.lawjournals.org/archives/2020/vol6/issue3/6-3-13

children and the elderly, and pose long-term damage such as asthma, coughing, chest pain, choking, and bronchitis, skin irritations, nausea, eye problems, headaches, birth defects, leukemia, cancers and even death.[300]

Iraq, including Kurdistan, is considered wealthy for having oil and gas. The crude oil production grew in Iraq by an average of 1.7 million barrels per day (b/d) from 2013 to 2019, and averaged at 4.7 million b/d in 2019. Furthermore, Iraq's crude oil production averaged nearly 4.4 million b/d in the first six months of 2022. These production estimates include oil produced in the KRI. However, in terms of natural gas, Iraq has nearly 135 trillion cubic feet (Tcf). Iraq's natural gas reserves at the end of 2017 are the 12th largest in the world.[301] Meanwhile, the MoNR announced that Kurdistan has about 45 billion barrels of estimated oil reserves and as much as 200 trillion cubic feet (5.67 trillion cubic meters) of natural gas reserves, i.e., around 3% of the world's total reserves.[302]

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However, some industries cause environmental destruction, particularly river pollution in the region. For instance, mining, quarries and oil activities have affected surface and ground waters, especially rivers, causing depletion and pollution. In particular, the development of oil operations contributed to environmental

[300] Ibid, 174.
[301] "Country Analysis Executive Summary : Iraq", U.S Energy Information Administration, last updated September 28, 2022, last modified November 17, 2022,, https://www.eia.gov/international/content/analysis/countries_long/Iraq/iraq_exe.pdf
[302] Ministry of Natural Resources, Oil and Gas, accessed March 29, 2021, https://gov.krd/mnr-en/publications/oil/.

degradation. This is mainly due to the fact that oil companies neglect their commitment to protect the environment.[303] Meanwhile, Law No. 8 (2008) states that:

> *"The Ministry, with coordination with the related agencies, puts suitable environmental conditions for the activities of exploration, mining, quarries, smasher, washers, mines, extraction of petroleum resources from pollution and depletion."*[304]

Even though oil project practices cause environmental degradation in the Kurdistan region at an alarming rate, special environmental regulations to control oil pollution are still not established.[305] Meanwhile, Law No. 22 (2007) for Oil and Gas in Kurdistan Region of Iraq authorizes the MoNR to enact specific environmental regulations for oil and gas projects in Kurdistan. The law gives the Minister of Natural Resources the authority to manage the oil and gas sector in an environmentally-sound manner to minimize its undesirable consequences upon Kurdistan's natural resources. It states:

> *"…to ensure that the petroleum industry is developed in a way that minimizes damage to the natural environment, is economically sustainable.."*[306]

In addition, Kurdistan's Production Sharing Contracts (PSC) emphasize the protection of the environment by international oil companies. Article 37/1 states that,

> *"First: A standard Production Sharing Contract shall include the following terms.*

[303] Shwan Omer, Khudhur Safaa, and Aldden Mohammed, "Penal Protection of Environment from Oil Operators Pollutants A Study in Light of Punitive Legislation in Kurdistan Region – Iraq", 2019, 183–90.
[304] Article 30.
[305] Arez Mohammed Sediq Othman, "Legal and Ethical Obligations of Oil Companies in Preserving Natural Environment; a Case Study of the Kurdistan Regional Government's Production Sharing Contracts," 397.
[306] Para two, Article 7 Oil and Gas Law No. 22(2007) in the Kurdistan Region of Iraq.

11. Provisions for securing the health, safety and welfare, environmental protection, training, and acquisition of goods and services, consistent with international standards and with the proposals made in accordance with Article 26 of this Law."

Despite having the legal rules in Law No. 22 (2007) for Oil and Gas, the MoNR prioritizes economic aspects over the protection of the environment. Moreover, the Board had failed to prevent oil pollution due to its poor legal status, mainly related to overseeing the environmental cases. In other words, the Board does not have such enforcement powers. The MoNR does not properly coordinate with the Board, and its focus on oil and gas investment has led to its ignorance of the environment. Therefore, it is better to give the role of supervising oil companies to the EPIB to enforce all environmental standards in the oil industry.

Figure 3. 2 Water pollution due to oil trucks accidents.
Source: (KNO, 2017)[307]

Kurdistan and other governorates of Iraq are facing oil pollution, including river pollution. To illustrate, the Euphrates, Tanjero,[308] and the Great Zab River are contaminated with oil wastes from oil projects in the surrounding areas. In addition,

[307] Kurdistan Nature Organization, 2017.
[308] Aziz, M. Salih, and Hama-Salh "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District,", 68.

oil trucks are repeatedly involved in accidents; between 2013-2014, a total of 38 oil truck accidents occurred (Figure 3.2) where each oil truck was carrying approximately 36,000 liters of fuel, causing soil and water contamination as almost all of them had flowed directly into the Serwan River.[309]

As mentioned above, oil projects in Kurdistan do not comply with the environmental legislations. The oil projects in the Tanjero River area contributed significantly to river pollution and environmental disaster. In this regard, respondent 9[310] stated:

> *"Generally, the oil projects cause environmental pollution, including river contamination. In Kurdistan, the way of extracting, refining and transporting crude oil is non-systematic. Oil transportation by trucks or discharges of water waste directly from the oil refiners into water resources causes river pollution and other environmental damage. For instance, oil refiners in the Tanjero River cause water pollution to the river."*

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On top of that, he also mentioned the illegal establishment of some factories in the Tanjero area:

> *"In Tanjero, some factories and industries have been made illegally such as oil refiners, plastic factories, cork factories, iron factories. This is because the owners of these factories have high positions in one of the powerful political parties or have a strong relationship with some people in high positions in the government or political parties. So, the Board and its committee do not have such strong power over these people to close their industry or remove it nearby the river or residential area. For instance, one of the organizations has data about one of the factories with a monthly discharge of*

[309] Hiwa Rashid, "The Role of Administrative Authority in Protecting Environment from the Harms of Oil Projects" (Master thesis, Alexandria University, Egypt, 2016.), 104.
[310] Respondent 9.

60,000 liters of dangerous wastewater directly into the Tanjero River."

With regards to the role of the MoNR, respondent 11 also emphasized on the responsibility of the ministry to include environmental protection as part of the planning for the oil industry. He[311] said:

"The MoNR is also responsible for water protection because oil companies cause environmental pollution, particularly river pollution. Therefore, the KRG does not seriously work to solve pollution in Tanjero. This might be due to the lack of awareness about water value by the KRG itself. They are more concerned about oil production development rather than water protection."

As explained by respondent 11, the MoNR prioritizes the financial aspects of the oil and gas industry rather than environmental destruction. Respondent 10, as an environmental activist, sheds light on the dangers of industrial wastes in deteriorating the water quality of the Tanjero River and their devastating consequences on humans, animals and all the biodiversity there. He said:[312]

"Many industries and 27 oil refiners in the Tanjero area release their liquid wastes (including different chemicals and heavy metals) without any pre-treatment into the Tanjero River. Usually, in July and August, thousands of fish deaths occur. Despite that, the polluted water is used for agriculture purposes and even drinking through the Darbandikhan dam. The polluted water from the Tanjero River reaches the Serwan River and goes to other Iraqi areas in Dyala and south of Iraq."

[311] Respondent 11.
[312] Respondent 10.

The Chairman of the Energy, Natural Resources, Industry and Trade Committee in the Kurdistan parliament on April 21, 2021, made a report to the president of parliament and subsequently the Council of Ministers (KRG) about some crucial water-related problems, including the non-completion of the new water project in Darbandikhan city, the decrease in water level in the Darbandikhan dam, and the pollution of water in the Darbandikhan dam. [313]

Furthermore, with regards to the factors of pollution of the Darbandikhan dam, he emphasized the illegal industrial activities nearby the Tanjero River:

> *"The wastes from illegal activities and factories such as oil refiners, car battery factories, and car oil factories in the Tanjero area, Sulaymaniyah, Halabja and Iran are directly discharged into the Darbandikhan Lake without any pre-treatment, and this water is given to the people. Based on the quality water tests, this water is not acceptable for drinking or human usage. It also has a high rate of some dangerous heavy metals such as Lead(Pb), which causes cancer and other human diseases."*[314]

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In this report, he suggested the completion of the water project in Darbandikhan, which was stopped due to lack of budget. Notwithstanding, it is crucial to prevent pollution, mainly from the industries and illegal factories surrounding the Tanjero River and the sewer system of Sulaymaniyah city.

Furthermore, on April 28, 2021, Hama Salah made report No (25) to the president of the parliament about the problem of low-quality and high-priced fuel and gas. This (as

[313] Ali Hama Salah, Chairman of the Energy, Natural Resources, Industry and Trade Committee in Kurdistan parliament, April 21, 2021.
[314] Hama Salah, April 21, 2021.

he mentions) is due to illegal oil refineries mostly located near the Tanjero River area. They produce low-quality fuel and gas despite knowing that the pollution generated causes various health hazards. Therefore, he suggested using legal oil refiners to supply oil and gas for people with an acceptable quality and affordable price.

Based on the above discussion and data from the respondents, wastes from illegal activities such as oil projects and industries cause Tanjero River pollution, which bring pollutant to the Darbandikhan lake. Moreover, the role of the Parliament in the Kurdistan region in combatting environmental challenges is still insufficient. Although there were some individual attempts in this regard, particularly concerning the Tanjero River, the study asks some Parliament members from the Health, Environment and Consumer Rights Committee (HECRC) about the Tanjero River problem. Unfortunately, some members from the HECRC answered that they do not have information about the matter. Meanwhile, the Tanjero River has become a well-known environmental problem in Iraq. In addition, regarding the role of the Parliament, the study asked respondent 4, who said:[315]

> *"The Kurdistan parliament, through its committees, has good performance in terms of censorship and reporting environmental cases. However, as a censorship agency, the parliament cannot enforce the law. Political parties have roles and interfere with the government. For instance, some attempts have been to invite the Minister of Natural Resources and Minster of Agriculture and Water Resources to Parliament. Sometimes they do not come to Parliament or do come to Parliament and give a good speech, but lack enforcement thus still causing challenges."*

[315] Respondent 4.

Meanwhile, the study believes that the Kurdistan parliament should perform efficiently, whether by monitoring the law enforcement by the government or taking legal actions upon ministries that do not obey the environmental law. As respondent 1[316] explained, the parliament has legal responsibility towards river protection by monitoring the government agencies (such as Environmental Protection and Improvement Board or Ministry of Agriculture and Water Resources, among others), inviting responsible ministers to parliament, asking questions, and even withdrawing trust from the ministers if necessary. He said:

> *"The Parliament as a representative of people and public interests is responsible for censoring water resources protection by its committees and may monitor, prosecute and investigate through legal mechanisms such questions or interrogation or withdrawal of trust from some related ministers such the Minister of Agriculture and Water Resources and so on."*

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Additionally, respondent 3 also criticized the parliament of Kurdistan about water resources preservation:

> *"There is no legal prosecution about water resources by the Parliament. After 30 years, the parliament starts to prepare a project about water resources protection. It is a big problem after 30 years of governance that we do not have a specific law about water, or that we do not have a good environmental law. The parliament is not really concerned about water protection. The existing laws are not enforced precisely.*" [317]

[316] Respondent 1.
[317] Abdulmutalib Raafat Sarhat, (Code: Respondent 3), Lecturer -Garmian University, date of interview: April 1, 2021 Thursday; Time 11:00 Am.

Based on the discussion above, despite inadequate legal protection for rivers from the harmful impacts of industrial wastes, there is a lack of enforcement and the Board has limited power to monitor oil activities and combat the illegal practices of some industries, including the oil projects in the Tanjero area. On the other hand, it is essential to discuss the legal bases for river protection from harmful human activities such as quarry factories, which cause river degradation in Kurdistan. This will be discussed in the next section.

(iv) Iraqi Law No.91 (1988) for the Regulation of Mineral Investment

Undeniably, quarries and washers, among other mining activities, have fundamental impacts on the river basin. As mentioned, based on Law No.8 (2008), the MoE (replaced by the Board) coordinates with other relevant institutions to put environmental conditions and measurements unto some industries such as exploration, mining, quarries, smashers, and washers, among others.

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The Iraqi legislature issued Law No. 91 (1988) for the Regulation of Mineral Investment. This law is enforceable in the KRI. The main objective of the Law is to implement scientific ways and comprehensive supervision over mineral investments in order to guarantee high-quality investment by the public and private sectors from the mineral field along with the protection of the environment and natural resources. Thereby, Law No. 91 (1988) emphasizes the protection of the environment by guiding the investors in performing their works based on the rules of law to ensure the natural resources are protected. For instance, the law obligates the investor to protect some public areas from the negative effects of mineral investments such as religious places, historical monuments, agricultural lands, forests, dam aria, reservoirs aria, and lands

located within or outside the border of the municipality, except some specific places that may be chosen by the Environmental Board to practice quarry activities.[318]

Furthermore, Law No. 91 (1988) attempts to take some measures to prevent the negative impacts of quarry projects. For instance, it prohibits quarry activities within 1000 meters from public roads and 1500 meters from bridges. Still, this law allows the relevant administration to exceptionally give permission to build quarry projects within these boundaries.[319] Likewise, Law No. 91 (1988) prohibits the establishment of quarry projects within military, oil and gas areas. It also prevents mining projects within 500 meters of oil and gas, unless approved by the related authority if lower than this limitation. In addition, quarry activities should be conducted far from industrial areas and electrical lines by 1000 meters, except with the approval from relevant authorities.[320]

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Although this law has some mechanisms to prevent the environmental consequences of such activities, to some extent, these provisions have an ambiguous stance about environmental protection compared to its huge consequences on the surrounding environment. For instance, despite mentioning some environmental elements like forests, dams, and agricultural lands, there is no explicit provision to protect the rivers from the impacts of mineral activities. Most of these projects exist nearby rivers such as the Tanjero, Great Zab and Serwan Rivers. It is critical to omit the existence of exceptions given to the relevant authorities to exceptionally allow the establishment of

[318] Article 3, Iraqi Law No. 91 (1988) for the regulation of the Mineral Investments.
[319] Para 5, Article 3.
[320] See Para 6, 7, 8, 9, and 10, Article 3, Iraqi Law No. 91 (1988) for the Regulation of the Mineral Investments.

quarry projects nearby public roads, bridges, or other prohibited areas based on Article 3. As it has been more than three decades since the issuance of Law No. 91 (1988), it is currently out of date for the present industrial situation and requires more development in this regard.

The Tanjero, Great Zab and Serwan Rivers are clear evidence of environmental destruction by quarry activities. Here, it is noticeable that the quarry activities nearby Serwan river have had fundamental impacts on its natural condition (Figure 3.3). The investors have caused damage to the river by shifting its direction, which poses a risk to the aquatic life and biodiversity nearby the river. The investors do not comply with their legal duty to resolve the deep holes or other dangers to the surrounding area, which sometimes causes death risk for those swimming in the river. Therefore, the relevant authority has a legal mandate to rigorously supervise every project nearby rivers or those that pose impacts on the rivers.

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Figure 3. 3 Impacts of quarry activities on the Serwan River
Source: (Marewan, 2021)[321]

[321] Marewan, 2021.

Additionally, the study obtained an image taken by the respondents, which confirms the critical impacts of quarry factories on the river basin. One of the interviewees mentioned the impacts of the mining projects particularly the quarry factory nearby the Grate Zab, Tanjero, and Serwan rivers. Respondent 10[322] said:

> *"Quarry activities are considered one of the main factors that cause river degradation. For instance, if you look at the Tanjero Bridge towards the downstream of the river, you will see a big quarry factory on the Tanjero River."*

As highlighted by the study respondent, quarry activities have caused river pollution, including the degradation of the Tanjero River. Therefore, it is crucial to develop legal protection of the river from the harms of quarry activities by improving the provisions of the Iraqi Law No. 91 of 1988 for the Regulation of the Mineral Investment, since the current version does not include sufficient provisions that control river damage caused by the mineral activities, particularly quarry projects. These projects have dire effects on the water quality and quantity of rivers such as the Tanjero River. The study also noted other enforceable legislations that have been violated by these mineral activities, particularly quarry projects, which had accelerated the environmental destruction of the river ecosystem in the region. These laws are discussed in brief in the following points.

Quarry activities nearby the rivers have affected the river direction and natural forest in the river basin area.[323] Therefore, these projects nearby the Serwan River have also violated other enforceable laws in the region. Law No. 10 (2012) for Forest in Kurdistan Region of Iraq has some provisions that emphasize on the preservation of

[322] Respondent 10.
[323] Respondent 3.

rivers and natural forests. Paragraph 3, Article 4 of the provision prohibits certain activities in the forest unless approval has been granted by the MoAWR, such as the establishment of temporary or permanent public or private facilities within the forest area. The provision also disallows the building of dams or barriers, or the shifting of river direction across the forest, or the establishment of quarry projects as well as the extraction and transporting of rocks, trees and soil.[324]

Unfortunately, the current practice of quarry projects nearby the Serwan river has caused damage to the natural forest nearby the river and other green herbs that form a natural habitat for the biological diversity in the area. The river basin is facing deforestation along with river direction alteration due to the development of dams or holes for extracting rocks or raw materials for production purposes.

On the impacts of these quarry factories on the water quality and quantity of the rivers, the study interviewed a water resources expert from Garmian University.[325] He emphasized the negative consequences of these activities on rivers:

> *"There are some factories and activities such as quarry projects on Serwan River. These projects cause dire impacts on the river. They break the law in different ways. For instance, they perform their work outside of the provided area, cut the natural trees and herbs on the river, change the river direction and damage the water quantity and quality in the river without any sufficient legal prosecution taken against them by the relevant institutions."*[326]

[324] Point 9, 10, Para3, Article 4. Law No. 10 (2012) For Forest in Kurdistan Region of Iraq.
[325] Respondent 3.
[326] Respondent 3.

Based on respondent 3, the quarry activities have caused environmental damage to the river ecosystem by impacting its quality, quantity and direction. Similarly, environmental degradation has occurred on the Tanjero River. As mentioned by the respondent, no effective legal prosecution has been taken against such law offences. As he explained, these industries do not obey the legal distance or boundaries for their activities; they break the law and illegally carry out production outside their boundary. Apart from violating the rules of Law No. 91 (1988) for the Regulation of Mineral Investment, they also break Law No. 3 (2018) for Preventing Overtaking in the Kurdistan Region.

These projects nearby the Serwan river basin area obviously exceed their provided area and overtake the river basin by changing its direction and making dams or deep holes. Based on the 2020 report by the Directorate of Oil and Mining in Garmian Administration (DoOM) (which is under the MoNR), about 40 mining and quarry factories exist under their authority. Based on the report, fines have been imposed on 27 of them for breaking the law and regulation by extracting materials out of their provided area. In other words, the DoOM does not impose a penalty for environmental offences. As the Director of DoOM in Garmian mentioned, they only have 3 employees for monitoring these mining projects. For each project, we hire one geologist, which is not necessary, but they make a report for us so that we can deal with these quarries and mining factories.[327] Here, the study noted that the DOMG is not properly equipped in terms of human resources to control menial activities nearby the river. The DoOM is not legally authorized to impose legal sanctions for

[327] Yadgar Fatah, Directorate of Oil and Mining of Garmian, "Annual Report of 2020," Kurdistan TV, 12 January 2021.

environmental damage; instead, they are authorized to obligate the operations to work within their provided area. The EPI Board is also not authorized to take action in protecting the natural resources nearby the quarry factory, including rivers, forests and so on. Law No. 89 (1991) does not provide a proper mechanism for coordination with the board.

Based on the discussion above, despite various legislations, a clear legal basis is absent for safeguarding rivers from the dire impacts of quarries and other mining industries near the river basin. The Board is not legally authorized to monitor and control the environmental impacts of quarries on the rivers. Furthermore, the DoOM does not properly or rigorously respond to the environmental harms caused by these activities. Based on Law No. 91 (1988), the DoOM may interfere if the factory practice goes beyond the permitted area, but not for environmental violations such as changing river direction, deforestation and water pollution. Therefore, it is recommended for environmental legislation to be developed in this regard to provide sufficient legal mechanisms to the relevant institutions, particularly the Board to avoid an overlapping of responsibility among the different institutions and to control the situation of the river basin. Poor coordination has caused further degradation to the Serwan River because the MoNR is not concerned about environmental impacts. To clarify the legal roles of the Ministry of Trade and Industry as the main institution for the industrial sector, this study sheds light on its legal status.

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(b) Law No. 10 (2010) for the Ministry of Trade and Industry in Kurdistan Region of Iraq (MoTI)

Based on Law No. 10 (2010) for the Ministry of Trade and Industry in Kurdistan Region of Iraq, the Ministry aims to make public policies for trade and industry in the region to accomplish social and economic developments. It states:

> *"The Ministry aims to draw up general commercial and industrial policies to achieve economic and social development in the region and is working to implement them in addition to implementing what falls within its competencies according to any other legislation in force in the region."*[328]

As can be seen, this provision does not mention the achievement of sustainable development in the industrial sector, which is about the protection of natural resources and economic development. As Chapter Two of this study mentions, sustainable development can be defined as "development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs".[329]

It is crucial to revise the content of this Article to emphasize the accomplishment of sustainability through the development of industries, which is highly necessary in the new industrialization era, as non-sustainable industrial improvement will damage our natural resources.

[328] Article 2 Law No. 10 (2010) for the Trade and Industry in Kurdistan Region of Iraq.
[329] Brian R. Keeble, "The Brundtland Report: 'Our Common Future", *Medicine and War*, vol. 4, 1988, https://doi.org/10.1080/07488008808408783.

Respondent 1[330] criticized Law No. 10 (2010) for the Ministry of Trade and Industry in Kurdistan Region of Iraq:

> *"What we noted about Law No. 10 (2010) for the Ministry of Trade and Industry is that the legislature's vision or purpose is not clear and serious about the importance of the linkage between industrial projects and environmental development planning in the region. Therefore, it is crucial for the legislature to seriously consider the essential issue, which is the obligation to gain environmental permission before the establishment and practice of all industrial projects, whether big, medium or small."*

As highlighted by respondent 1, this law is clearly not concerned with environmental protection. Moreover, to achieve its objectives, Law No. 10 (2010) gives the fundamental role to the MoTI. One of the significant duties of the Ministry is to develop industrial policy in the region, and monitor the establishment and practice of industrial projects by giving permission based on specific requirements, as stated below:

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> *"Preparing annual, medium and long-term plans and studies for industrial projects, studying the economic and technical feasibility for them, supervising industrial projects and institutions to monitor and direct them and evaluate the results of their plans in terms of quantity and quality, and participate in preparing the necessary legislation to sponsor and develop them in cooperation with the competent authorities."*[331]

As mentioned in the above Article, the Ministry is authorized to monitor industrial activities and assess their performance, as emphasized in the phrase "*studying the economic and technical feasibility for them"*. Although the environmental aspects

[330] Respondent 1.
[331] Para 6, Article 3.

come under technical feasibility, it is critical to clearly recognize the environmental protection spheres within the monitoring process as the main task of the Ministry. This is because there is an absence of any concern for preserving the environment or natural resources under the definition of the Ministry's duties, considering that the industrial sector has a huge impact on natural resources, including water resources such as the Tanjero River.

The impacts of industrial activities are not merely on surface water resources, but also on groundwater. Therefore, water utilization for industrial purposes should be properly regulated, as over-reliance on groundwater would cause a decline of the groundwater portion. The lack of sufficient legal restrictions and regulations to rationalize water consumption and weaknesses in imposing water reuse and treatment pose risks to water resources in terms of quality and quantity.[332] Therefore, industrial regulation should be developed to ensure more sustainable ground and surface water in the region, particularly for the industrial sector.

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To determine the impacts of industrial activities on the Tanjero River specifically on the surface and ground water, the study interviewed an expert from the Directorate of Underground Water in Sulaymaniyah.[333] He believes that Law No. 8 (2008) is not adequately concerned about the industrial impacts on water resources, particularly on groundwater utilization:

> *"There is no special water law in Kurdistan* (in the time of conducting this interview). *Law No. 8 (2008) does not sufficiently*

[332] Alessandro Tinti, "Water Resources Management in the Kurdistan Region of Iraq,", 3.
[333] Respondent 12, Directorate of underground water in Sulaymaniyah (Master in underground water, Bachelor Geology), date of interview, March 6, 2021, Time 8:30 Pm.

deal with the water protection issues. For example, it does not include details about underground water utilization for industrial purposes."

According to respondent 12, this provision is not adequate enough to control the impacts of industrial activities on surface or groundwater resources. Article 23 only mentions the issuance of special regional standards for surface, ground and drinking water:

"Determination of regional standards for surface, ground, and drinking water will be set by regulation."

Certainly, this provision is not enough for managing water quality and quantity, whether for underground or surface water such as rivers. The legislation should clearly determine the executive authority and courts of which standards should be followed. The ambiguousness of the law implicates the government institutions and courts to implement this law. Despite that, there is no such regulation yet in this regard.

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3.4.2 The legal provisions to control sewerage waste

As discussed earlier in the study, sewerage systems are among the main factors that cause water contamination. Kurdistan's water resources, such as rivers as the main surface water body, are facing pollution at an alarming rate from sewage wastes, among others. This study henceforth examines the adequacy of the current environmental laws in preventing river pollution caused by sewer systems.

Poor sewerage treatment facilities are considered one of the water-related crises in Iraq[334] , including the Kurdistan region. Sewer waste causes pollution in water resources such as the Tanjero River.[335] Despite poor or incomplete sewer infrastructure, no sewerage treatment plants have been developed in the region to date, thus causing pollution to the soil, water and food chain due to the direct discharges of municipal and industrial untreated wastewater into the rivers.[336]

The Tanjero River pollution due to sewer waste is a tangible example. Sewage wastewater causes the Tanjero River to be polluted with heavy metals such as Fe, Mn, Ni, and Cr due to the absence of water treatment before discharging the sewerage wastewater into the river.[337] As a result, based on the report by the MoH, water contamination in the Darbandikhan Lake through the Tanjero River had sparked waterborne diseases and cancers, which is an outcome of sewer wastewater being directly dumped from Sulaymaniyah city into the Tanjero River without any treatment.[338]

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Rapid urbanization in Kurdistan, including Sulaymaniyah city had caused more expansion, especially after 2003. However, public services are not at a desirable level due to poor strategic planning, and sewer wastewater is poorly developed and discharged into the Tanjero River without considering the environmental

[334] Roz Price, "Environmental Risks in Iraq", 2018, accessed August 5, 2021 https://www.gov.uk/research-for-development-outputs/environmental-risks-in-iraq.
[335] Majid, Khwakaram, and Gado,and Majeed, "Pollution Status Evaluation of Some Heavy Metals along Some Surface Water Sources by Multivariate Data Analysis at Sulaimani Governorate", 67.
[336] Tinti, "Water Resources Management in the Kurdistan Region of Iraq,", 3.
[337] Aziz, Salih, and Hama Salh, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District,", 71.
[338] Othman, *Environmental Health Assessment in Sulaymaniyah City and Vicinity*, 51.

consequences and dire health results.[339] As mentioned earlier, the river has been verified to have high rates of heavy metals such as Cd, Cu, Ni, Pb and Zn and other contaminants, even higher than the international and local standards.[340] One contributor is household waste, including various chemicals from cleaning usage that flow through the sewer system reaching the Tanjero River.

In addition, sewerage wastewater from Sulaymaniyah city is collected through a wide network of pipes, which later merge into 19 underground concert boxes. All of these box channels transport the wastewater outside the city and flow into the field like a stream. Fourteen of these boxes flow into the Tanjero River in Sarchinar, while some of the open boxes are located inside the new master plan of the city, which currently consists of some residential areas such as the Kani Goma village and other urban residential areas due to the expansion of the city.[341] Respondent 5, who is the Director of the Environment Protection and Improvement Administration of Sulaymaniyah [342] admitted the fact that the sewerage from Sulaymaniyah city and industries had caused the Tanjero River pollution:

> *"The sewerage wastes of Sulaymaniyah city and Tanjero town are discharged directly into the Tanjero River in a continuous manner, which definitely causes pollution. Our Directorate has asked some of the industry activities in the Tanjero area to build water treatment facilities. Some obey, while others still do not comply with our regulation. Therefore, we take legal prosecution against them without any exemption."*

[339] Ibid, 25, 31.
[340] Omed Muhammad Mustafa, "Impact of Sewage Wastewater on the Environment of Tanjero River and Its Basin within Sulaimani City/NE-Iraq", (M.Sc Thesis, University of Baghdad, 2006), 206.
[341] Othman, "*Environmental Health Assessment in Sulaymaniyah City and Vicinity,"*, 25.
[342] Respondent 5.

According to respondent 5, apart from sewer wastes from the households of the city, some industrial activities also directly discharge their wastewater into the Tanjero River. Therefore, as he mentioned, the environmental authority takes legal action by imposing a legal fine and other penalties for such violations. To determine the responsibility of the city municipal, the study interviewed another respondent[343] from the municipality of Sulaymaniyah, i.e., the Director of the Service Department Sulaymaniyah Municipality, who mentioned that sewer waste contributes about 60% of the wastes dumped in the river:

> *"If sewerage waste treatment plants are established, I can say that 60% of the Tanjero pollution would be solved. The remaining pollution caused by factories can be solved by obligating them to use environmentally-friendly equipment."*[344]

Based on the above, it can be noted that sewer waste is not controlled in the region, thus causing river pollution. Therefore, a comprehensive legal protection of water resources is needed to regulate and manage the sewer system infrastructure. Water institutions should legally authorize the management of sewerage systems, including their establishment and development. A private sewer system for trade effluent is essential to be regulated. Therefore, some countries consider these issues seriously because discharges of wastes by industries and other private agencies significantly impact surface and groundwater quality.

Meanwhile, the Kurdistan region faces challenges related to sewer system management, i.e., from poor sewerage infrastructure and incomplete collectors, to the

[343] Respondent 13, Director of Services Department of Sulaymaniyah Municipality, date of interview, February 20, 2021 Saturday, Time 12:30 Pm.
[344] Respondent 13.

absence of sewerage water waste treatment plants.[345] There is no independent water board in Kurdistan, and sewerage systems are under the authority and supervision of the Ministry of Municipality and Tourism (MoMT), which will be discussed further in the next point.

(a) Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq

Although sewerage waste has critical impacts on the water resources in the region, Law No. 8 (2008) for Environment Protection and Improvement of the Kurdistan Region of Iraq does not include clear provisions about sewer system or prevention of river pollution due to sewerage waste, whether from private or public sewer systems. As emphasized by some respondents,water protection is inadequate within Law No. 8 (2008) because it only has three Articles about water protection, namely Articles 22, 23 and 24. As discussed earlier, these articles do not clearly and comprehensively include all sources of pollution, including sewerage wastes. The study looks at Law No. 3 (2010) of the Environmental Protection and Improvement Board to investigate whether the Board is authorized with the management of sewerage and drainage systems in the region.

(b) Law No. 3 (2010) of the Environmental Protection and Improvement Board

Law No. 3 (2010) of the Environmental Protection and Improvement Board in Kurdistan Region of Iraq does not provide legal authority to the Board to be an administrative agency for sewerage and drainage systems. While other countries such

[345] Respondents 2, 5, 11, 13, and 14.

as Singapore put their sewer and drainage system under the management of an independent water agency, Kurdistan has no specific independent water agency, causing the water sector to be fragmented under different institutions based on different legislations. The study hence examines Law No. 12 (2010) of the Ministry of Municipality and Tourism in Kurdistan Region of Iraq to determine the legal jurisdiction of the ministry in preventing river pollution, as the Ministry of Municipality and Tourism (MoMT) is the agency responsible for managing the sewerage and drainage system in the region, based on Law No. 12 (2010).

(c) Law No. 12 (2010) of the Ministry of Municipality and Tourism in Kurdistan Region of Iraq (MoMT)

This Ministry was established based on Law No. 12 (2010) of the Ministry of Municipality and Tourism in Kurdistan Region of Iraq. In accordance to this Law, the Ministry has some substantial objectives and responsibilities relevant to the municipality and tourism services, including access to clean drinking water, the building of a sewer system to collect water wastes from household usage, drainage, and the establishment of wastewater treatment plants, among others.[346]

Although it appears that the MoMT manages the public sewerage systems in Kurdistan, the law remains ambiguous in terms of the private sewer systems. Law No. 12 (2010) for MoMT is not clear about the obligation of the private sector and whether the Ministry is responsible for private sewerage systems or not. Furthermore, the law does not differentiate between private and public sewerage systems. Looking at the

[346] Article 2, Law No. 12 (2010) for the Ministry of Municipality and Tourism in Kurdistan Region of Iraq.

provisions of Law No. 12 (2010), it could be understood that the MoMT has duties for all the sewer sectors, whether public or private, from its establishment, maintenance, alteration and abolishment. Moreover, the Ministry has a specific department of sewerage systems called the General Directorate of Water and Sewage.[347] Hence, this problematic issue must be addressed because private institutions discharge their water wastes without treatment into the public sewer system and contribute significantly to river pollution.. Moreover, some private industries are not provided with the sewer system to connect their sewer system with the public sewer system.

Therefore, it is advisable to adequately develop the law by making clear obligations upon the private sector to build their sewer system and treatment plants or pay the cost of sewer establishment and development with effective penalties to businesses that neglect this duty. Singapore's legislations, such as the Sewerage and Drainage Act (10) of 1999 are a good guide for the Iraqi and Kurdistan's legislature to develop relevant laws and regulations.

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In brief, based on the discussion above, in Kurdistan, the MoMT is legally responsible for providing municipality services, including providing potable water and sewerage systems to the people based on Law No. 12 (2010) for the Ministry of Municipality and Tourism.

Recently, Kurdistan parliament has issued a new law for the Ministry of Municipality and Tourism named "Law No.7(2022) for the Ministry of Municipality and Tourism

[347] Para 5, Article 3, the Law No. 12 (2010).

in Kurdistan region of Iraq".[348]Based on Article 9 of the new law, Law No.12 (2010) of the MoMT has been abolished. Among the improvement under new law is shifting the objectives of the ministry in Article 2 under the previous law to the commitments of the ministry under new law in Article 3. Even though the Article 3 in the new law is almost the same as Article 2 of the abolished law regarding the water issue, it is considered better by bringing more clear paragraphs. As Para 4, Article 3, stated among the duties of the ministry is

> *"Four: Providing drinking water, establishment of the water stations and water networks for transporting water for houses."*
> *Five: Establishment of the sewage networks for heavy water and rain water, with the establishment of the specific station for the water treatment."*

Based on Article 10 the minister of the MoMT should issue clear instructions to facilitate the enforcement of the new law. However, all the relevant institutions should implement Law No.7(2022) for the MoMT according to Article 11 of the law.

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3.4.3 The Law No. 8 (2008) EPI to prevent pollution by municipal, medical and agricultural wastes

It is necessary for the study to find out whether the existing legal provisions are adequate for controlling pollution generated by different sectors, be it municipal, medical or agricultural. Thus, the study attempts to examine the relevant legal provisions of Law No. 8 (2008) EPI to clarify whether or not they sufficiently address the impacts of the sources of environmental pollution, including river pollution. The study analyzes the relevant legislations for preventing pollution by each of the sources below:

[348] The new law has been published in Kurdistan Gazette No.287 on August 11, 2022, based on the article 13 the law enforced from the date of its publication.

(a) River pollution by municipal wastes

River pollution control requires efficient and sustainable waste management. It is crucial to explain that waste management entails four essential steps, namely:[349]

1. Sensitisation: This is crucial for building a comprehensive waste management system by having a fully aware decision-maker team, who knows that waste management is a basic human need as a public service.
2. Implementation/integration: Implementation (in terms of waste collection and sanitary landfilling) and integration are also indispensable parts of waste management. The integrated system can be established by making rules to recognize the informal sector and incorporate it into the formal waste management system.
3. Transition: After building a basic waste management foundation, the recovery of resources from waste is considered. This level requires a broader participation by the public to attain an efficient resource recovery system.
4. Optimisation: In this stage, technology plays a vital role in producing a sustainable solution. There are several fundamental questions that need to be answered such as "How much recycling is needed?", "What counts as recycling?", "What extent of recycling is considered sustainable?" and "What type of recovery is preferred?" Subsequently, the process will be regulated and the market condition will be taken into account to attain the optimal answers to these questions. In Steps 1 and 2, political welling and administrative structures

[349] Arne M. Ragossnig and Aleksandar Jovovic, "Waste Management Life Cycle: Sensitisation - Implementation/Integration - Transition - Optimisation", *Waste Management and Research* 34, No. 9 (2016): 813–15, https://doi.org/10.1177/0734242X16661064.

performance is considered as the prerequisites, while Stages 3 and 4 are characterized by the market factor, which plays a substantial role.[350]

Municipal waste management conducted safely, environmentally-friendly and sustainably should become the top priority for a modern country.[351] Certain developing countries, including EU member states (for example), still use landfills as a traditional way of managing waste. However, such an approach contributes to environmental destruction and human health problems.

Iraq and Kurdistan are still practicing traditional waste management, namely the landfilling of solid wastes, particularly municipal ones.[352] Based on 2021 data, the Kurdistan region generates approximately 2,550,000 million tons of solid waste annually, or 7000 tons daily. Specifically, the Hawler governorate generates 2600 tons of waste, Sulaymaniyah 1850 tons, Dohok 1620 tons, Garmian 470 tons, and Rapareen 400 tons. The report indicated that about 100% of these solid wastes are currently landfilled, including medical wastes. Moreover, based on the above data, Sulaymaniyah is the second highest waste producer generating 1850 tons of waste every day, compared to other governorates in the region.

In addition, a study inquiry indicated that the Municipality of Sulaymaniyah is now facing difficulties in managing wastes in the Tanjero River. As mentioned above, the

[350] Ibid.
[351] Luka Traven, Igor Kegalj, and Iva Šebelja, "Management of Municipal Solid Waste in Croatia: Analysis of Current Practices with Performance Benchmarking against Other European Union Member States", *Waste Management and Research* 36, No. 8 (2018): 663–69, https://doi.org/10.1177/0734242X18789058.
[352] Ranj Sangawe, Le gall Ranj Program, Rudaw Tv., accessed March 22, 2021, https://www.rudaw.net/sorani/onair/tv/episodes/episode/lagal-ranj-22032021 .

Tanjero River has been polluted by different anthropogenic wastes including industrial and sewer wastes from Sulaymaniyah city and medical and other solid wastes generated by the municipality or private companies. This study interviewed the Director of Services Department in the Sulaymaniyah Municipality[353] about waste management issues, specifically in relation to the pollution of the Tanjero River:

> *"In 2010 and 2011, the Municipality of Sulaymaniyah attempted through investors to bring some mobility treatment equipment for the purification of sewer waste, but this project was not implemented. I do not know why it was not implemented. However, currently, the Municipality, through the private sector, has organized a Recycling Project in Tanjero, which is completed and will start to work soon."*

Regarding the establishment of a new project for recycling wastes in Sulaymaniyah city, he said:

> *"One of the positive points about the newly established recycling factory in Sulaymaniyah is that the project has a wastewater treatment plant because these solid wastes consist of liquid wastes and leakage, which will be treated in this factory before being discharged into the Tanjero River."*

The newly established factory "Mechanical Biological Treatment –MBT) for solid waste treatment had been carried out by the private sector in the Tanjero area at the Sulaymaniyah governorate. Although the project was completed in August 2020 and has started receiving waste, it has not started officially.[354] However, the establishment of MBT is considered a significant step towards the safe management of solid wastes in Kurdistan.

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[353] Respondent 13.

[354] Varen Tofeq, Health Directorate of Sulaymaniyah, Legal Ranj Program, Rudaw Tv., accessed March 22, 2021 Monday, https://www.rudaw.net/sorani/onair/tv/episodes/episode/lagal-ranj-22032021.

Furthermore, the factory has the capacity to treat 85% of the received wastes, while 15% of the remaining materials are considered non-active substances that are sent to the designated landfilling area inside the factory and later moved to a green area.[355] The factory receives about 1200 tons of municipal solid waste every day, i.e., about 400,000 tons of solid waste from Sulaymaniyah city annually. Meanwhile, as mentioned above, the city generates about 1850 tons of solid wastes every day. Therefore, the factory does not have the capacity to cover all the produced wastes currently, and the wastes is continuously increasing due to industrial and population development. Furthermore, this project is unable to recycle certain wastes such as medical, sewer, construction and building wastes.[356] However, it has been reported that the project is able to produce an environmentally-friendly energy called Refuse Derived Fuel (RDF), which can access 20% to 30% of the electricity for the Cement Factories in the Bazian town near the city.[357]

Some people, particularly those from the Zhalay Jaza Jaf village, criticized the recycling factory because it causes air pollution and transmits a bad smell to the residents nearby the factory[358]. However, the experts from the factory denied the prevalence of any air pollution.[359] The study had attempted to acquire data about MBT factory by contacting one of the managers of the operational department, but even after several attempts, the effort remained futile. Respondent 14[360] , who is living in the

[355] Ibid.
[356] Twana Jafer, Legal Ranj Program, Rudaw Tv, accessed March 22, 2021 Monday, https://www.rudaw.net/sorani/onair/tv/episodes/episode/lagal-ranj-22032021.
[357] Ibid.
[358] Respondents 14, and 15.
[359] Twana Jafer.
[360] Respondent 14, resident in Tanjero River area, date of interview: April 8 2021, Time 10:30 Am.

Tanjero River area, affirmed the fact that the new treatment factory generates a bad smell:

> *"There is a bad smell in Zhala village, which is due to the operation of the new recycling factory near the village."*

Therefore, as mentioned by respondent 14, further impacts of the establishment of the new factory nearby the residential area should be taken into account. Similarly, respondent 15, a head of the community as a representative of the residents of the Tanjero River area,reaffirms the pollution problem nearby the river, particularly solid wastes. He also mentioned the bad smell and poor capacity of the MBT to solve the problem in their area. Thus, The Tanjero River pollution is an ongoing problem, and the factory is not able to treat all the generated municipal wastes in the city.

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However, some countries adopted strategic planning to manage wastes in an environmentally friendly way. For instance, the Circular Economy package adopted by the European Commission is a very ambitious strategy that has reformed certain legal frameworks on waste management such as the EU's Seventh Environment Action Programme. This programme has significant objectives for managing municipal solid waste (MSW), including achieving a recycling rate of 65% by 2030 and decreasing landfilled wastes to no more than 10%.

The proposed targets are very ambitious and EU member states have different capabilities to meet these goals. For example, based on the Statistical Office of the European Union (EUROSTAT), some EU member states, such as Slovenia, Italy, Belgium, Poland and Germany, already have high recovery rates, while others, such

as Bulgaria, Romania, Greece and Malta are still facing obstacles and still utilize disposal as the preferred treatment modality.

Additionally, the study found that Croatia recycled 15% of its municipal waste in 2013, two times lower than the EU's average of 32% and four times lower than the EU's target for 2030 (65%). Moreover, the incineration rate is about 3%, while 82% (by weight) is currently being landfilled. Therefore, although Croatia has poor waste management, efforts are being made to build a comprehensive waste management system through the waste management plan for the Republic of Croatia 2017-2022.

EU countries have different administration bodies that work together at the national, regional, and river basin levels to protect water from pollution. One example is the Water Framework Directive (WFD), which started work in 2000 with the objective of making an integrated and coherent policy in the EU by adopting an integrated method for managing water quality and quantity in a sustainable way. Collaboration between water management characters and agriculture is crucial to curb water pollution due to agricultural sources.

EU member states have a successful water management system. Their water resources are in a safe condition with drinkable tap water as well as coastal water, rivers and lakes that are safe for swimming. The adequacy of a legal framework in EU states is the main reason to reach sustainable water management along with many other efforts including scientific studies, enhancement of technologies, and efficient communication.

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In examining the role of the MoMT especially in the case of the Tanjero River pollution and the challenges faced by the municipality, respondent 13 i.e. the Director of the Services Department of Sulaymaniyah Municipality[361] said:

> *"After 2003, Iraq, including Kurdistan had developed significantly in many sectors including the urban, industrial, investment, and oil and gas sectors. These developments had caused environmental pollution such as river pollution."*

In terms of the types of pollution in the Tanjero River, he said:

> *"In fact, we have two types of pollution in the Tanjero River, organic and non-organic. Organic pollution comes from household wastes, mostly human wastes that are less dangerous than non-organic pollutants such as industrial wastes. Meanwhile, non-organic pollution entails wastes from different industries such as the 8 oil factories, oil refiners, and other existing industries, which discharge their wastes directly into the river and cause water and soil pollution, human diseases and biodiversity losses."*

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As mentioned by Respondent 13 above, non-organic pollutants in Tanjero River area by industrial projects cause water, soil pollution. Consequently, such wastes cause the spread of human disease and loss of biodiversity. Moreover, Population growth and economic development are the main drivers of pollution, causing river pollution due to organic and non-organic wastes such as sewer, municipal, medical and industrial wastes.

Based on the discussion above, the municipality is still facing problems in managing municipal wastes in a sustainable manner. This may be due to the lack of a recycling

[361] Respondent 13.

and treatment system and poor coordination between the municipality authority and other institutions to prevent and control river pollution. It is crucial to develop a proper municipal waste management in a sustainable manner to prevent environmental degradation such as water resources pollution. Thus, there is an urgent need to develop a clear and long-term strategy based on a sufficient legal framework to curb the problem of poor municipal waste management.

(b) River pollution by medical wastes

Although healthcare services save lives, they also produce wastes, of which about 20 percent brings risks of infection, trauma, chemical, and radiation exposure. Medical waste treatment and its methods of elimination require considerable technical and financial resources and an adequate legal framework.[362] Therefore, safe and sustainable management of medical waste has become the top priority for modern countries.[363]

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The term "medical waste" can be defined as "all wastes produced in healthcare or diagnostic activities".[364] Based on the US Medical Waste Tracking Act (1988), medical waste is defined as "any solid waste that is generated in the diagnosis, treatment, or immunization of human beings or animals, in research, or in the production or testing of biologicals".[365] According to the WHO, medical wastes can be categorized into different types, as listed below (Table 3.4).

[362] International Committee of the Red Cross (ICRC, *Medical Waste Management*, *ICRC)* (Geneva, 2011), https://doi.org/10.1016/B978-0-12-381475-3.10023-3.
[363] Traven, Kegalj, and Šebelja, "Management of Municipal Solid Waste in Croatia: Analysis of Current Practices with Performance Benchmarking against Other European Union Member States,", 663.
[364] ICRC, *Medical Waste Management*.
[365] Zarook M. Shareefdeen, "Medical Waste Management and Control", *Journal of Environmental Protection* 03, no. 12 (2012): 1625–28, https://doi.org/10.4236/jep.2012.312179.

Table 3. 4

Categories of medical wastes

Category	Type of waste
Infectious waste	Waste contaminated with blood and other bodily fluids (e.g. from discarded diagnostic samples), cultures and stocks of infectious agents from laboratory work (e.g. waste from autopsies and infected animals from laboratories), or waste from patients with infections (e.g. swabs, bandages and disposable medical devices).
Pathological waste	Human tissues, organs or fluids, body parts and contaminated animal carcasses.
Sharps waste	Syringes, needles, disposable scalpels and blades, etc.
Chemical waste	Solvents and reagents used for laboratory preparations, disinfectants, sterilants and heavy metals contained in medical devices (e.g. mercury in broken thermometers) and batteries.
Pharmaceutical waste	Expired, unused and contaminated drugs and vaccines.
Cytotoxic waste	Waste containing substances with genotoxic properties (i.e., highly hazardous substances that are, mutagenic, teratogenic or carcinogenic), such as cytotoxic drugs used in cancer treatment and their metabolites.
Radioactive waste	Products contaminated by radionuclides including radioactive diagnostic materials or radio therapeutic materials.
Non-hazardous or general waste	Waste that does not pose any particular biological, chemical, radioactive or physical hazard.

Source: (WHO, 2018)

According to the WHO (February 2018), 85% of wastes from hospitals are similar to household or municipal wastes, while another 15% is considered hazardous and may

be infectious, toxic and radioactive, thus requiring careful management.[366] People who may be exposed to the risk of infection or other diseases due to such wastes include medical staff, janitors, medical center visitors, patients and any other persons who have been in contact with such wastes, including children or workers. According to the estimation by the WHO, "injections with contaminated syringes caused 21 million hepatitis B virus (HBV) infections (32% of all new infections), two million hepatitis C virus (HCV) infections (40% of all new infections), and 260 000 HIV infections (5% of all new infections) in the year 2000".[367] Some existing guidelines and standards are useful for implementation in medical waste management by local governments.

(i) International guidelines for medical waste management

Some standards and guidelines are produced by international efforts such as those made under the supervision of the UNEP and WHO. These available guidelines are certainly useful for national stakeholders to build a comprehensive legal framework for safe medical waste management.

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The Basel Convention in 1989 is considered one of the most comprehensive international conventions regarding the management of hazardous waste, including medical waste. Every member party in the convention should enact proper national legislation to prevent and penalize illegal traffic of hazardous and other wastes. Each member must ensure that hazardous and other wastes are managed and disposed of in an environmentally-friendly way. Iraq approved the convention on May 2, 2011, and

[366] "Health care waste", WHO, February 8, 2018, accessed June 26, 2021, https://www.who.int/news-room/fact-sheets/detail/health-care-waste

[367] Nandini D.B, and Manickam Selvamani Mwghalal Priya.P, "Healthcare Waste Management," *Journal of Dental Practice and Research*, no. June (2013): 23–27, https://doi.org/10.1061/9780784414101.ch15.

it entered into force on July 31, 2011.[368] There are some measures used to control or minimize the hazards of medical waste[369] such as:

A) Segregation: this is useful for preventing the contamination of non-hazardous waste by hazardous waste, making transportation easier.

B) Separating Different Categories of Medical Wastes: Putting different medical wastes in different containers (e.g., infectious and pathological wastes, and sharp objects) is crucial. For instance, yellow plastic bags are used for infectious medical wastes meant to be disposed of by incineration or deep burial in landfills. If the waste is to be treated by autoclave or microwave, they will be put in red plastic bags or containers.

C) Disinfection: Chemical disinfectants (i.e., chlorine dioxide, sodium hypochlorite, or per acetic acid) are sometimes used as a useful method to decrease the toxicity of some medical wastes. For solid wastes, disinfection is effective only if the waste materials are shredded. Sometimes, this method causes hazard; therefore, it is not recommended for treating pharmaceutical, chemical, or infectious wastes.

D) Incineration: This is the common means for treating medical waste. It treats wastes that cannot be recycled, reused or disposed of in a landfill.[370] Incineration relies on the process of destroying waste by burning it at high temperatures in a special furnace. The main advantage of incineration is that it decreases the volume of wastes by 50-400 times. The main disadvantages are that it is costly and generates smoke and pollution risks.

[368] BASEL, Waste management an essential public service in the fight to beat COVID-19. The United Nations Environment Programme (UNEP) and The Basel Convention, accessed 12 June, 2021 URL:http://www.basel.int/Implementation/PublicAwareness/PressReleases/WastemanagementandCOVID19/tabid/8376/Default.aspx.
[369] Shareefdeen, "Medical Waste Management and Control,", 1626.
[370] Mwghalal Priya.P, "Healthcare Waste Management,", 25.

E) Disinfection by Plasma: This method is used to treat medical wastes. It is better for the environment as it eliminates the release of irregular forms of NOX and highly toxic substances. Hit also has low energy consumption. Other technological methods have also been developed to control medical waste and transform it into safer or normal municipal solid waste.

In addition, based on the *Safe management of wastes from healthcare activities*,[371] after preparing the national policy for managing medical wastes, supporting legislations and regulations should be developed. The legislation should describe what is required from healthcare staff and explain the mechanisms for their enforcement. Thus, the legal bases should provide specific regulations on the treatment of each waste category, i.e., segregation, collection, storage, handling, disposal, and transporting, on top of the legal responsibility and training requirements. According to the *Safe management of wastes from healthcare activities* by the WHO,[372] the national legislation of medical waste should include some essential elements as follows:

a. a clear definition of hazardous healthcare waste and its various categories;
b. a precise indication of the legal obligations of the healthcare waste producer regarding safe handling and disposal;
c. specifications for record-keeping and reporting;
d. establishment of permit or licensing procedures for systems of treatment and waste handling;
e. specifications for an inspection system and regular audit procedures to ensure enforcement of the law and for penalties to be imposed for contravention;

[371] "Safe management of wastes from health-care activities", World Health Organization, edited by Y. Chartier et al. – 2nd ed, 2014, accessed June 26, 2021, https://apps.who.int/iris/bitstream/handle/10665/85349/9789241548564_eng.pdf.;jsessionid=8120441D30FF891FA71771297CE928D1?sequence=1
[372] Ibid.

f. designation of courts responsible for handling disputes arising from enforcement of, or non-compliance with, the law.

Based on the above discussion, it is essential to take into account the existing standards while developing the legal framework for medical waste management in the region. Thus, the study examines the adequacy of the relevant environmental legislations to determine whether these rules and guidelines are included in medical waste management.

(ii) Medical waste control under Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq

Based on reports in 2018, 75% of medical waste from local hospitals in Sulaymaniyah city is disposed of in the Tanjero River area in the southern part of the city.[373] Possible exposure may occur through direct contact, airborne transmission, contaminated water and the environment in general.[374] The study examines whether such pollutants are present in the Tanjero River area. Respondent 9[375] confirms the discharge of these wastes nearby the Tanjero River by private hospitals and laboratories:

> *"In the Sulaymaniyah governorate, we have eight private hospitals that are illegally throwing their wastes (such as cancer wastes, body parts and expired medicine). Instead of burning their wastes in a specific burner, these hospitals give them to companies that collect the wastes of the city, and give them money. These companies bring these medical wastes along with other wastes of the city to the Tanjero River area. I have a video to prove that. Meanwhile, medical laboratories also discharge their wastes (solid and liquid) in a non-*

[373] Solid waste dumpsite in Sulaymaniyah, Kurdistan Region of Iraq," Environmental Justice Atlas, 2018, accessed 9 June, 2021, https://ejatlas.org/conflict/dump-site-in-sulaymaniyah-kurdistan-region-of-iraq.
[374] Shareefdeen, "Medical Waste Management and Control,", 1626.
[375] Respondent 9.

scientific way, including blood, and other wastes are thrown in the sewer system or taken by collector companies."

According to respondent 9, private hospitals do not follow environmental standards and rules, so they discharge their liquid waste into the public sewerage system. Their solid wastes are collected by private companies and disposed of in the Tanjero River area along with other municipal wastes. Therefore, medical waste management requires a comprehensive legal framework. Some countries adopt a special legislation to manage medical wastes. The Medical Waste Tracking Act (MWTA) of 1988 is the first law regulating the systematic management of medical wastes in the US. This law was established due to some life-threatening incidents. For instance, in June 1987 in Indiana, 12 children played with vials they found in the dumpster near a health center. These vials were filled with blood, and two children were infected with AIDS. The US Environmental Protection Agency (EPA) later pushed Congress to enact this law in 1988. The MWTA required the EPA to make a two-year medical waste demonstration program. [376]

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As mentioned earlier, the region has a poor waste management system, including for medical wastes. This is due to a lack of clear and comprehensive environmental legislation or other specific legislation for medical wastes. In particular, Law No.8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq does not explicitly include medical waste control. Despite this inadequacy, no national regulations have been specifically developed by the Board or Ministry of Health based on the recommended international guidelines for medical waste management.

[376] Shareefdeen, "Medical Waste Management and Control,", 1625.

However, some local instructions by the Ministry of Health (MoH) to separate medical wastes in hospitals are not comprehensive enough. Based on the study inquiry, the instruction is not enforced completely in all hospitals, particularly those outside of the Sulaymaniyah governorate. In other words, it is essential to develop a national regulation to highlight the threat of waste and establish adequate mechanisms to deal and manage these wastes from their sources. Article 34 states:

> *"It is not permissible for any person to manufacture, store, bury, incinerate, sink, use, treat or dispose of radiant substances or wastes (liquid, solid, or gaseous) only according to the instructions issued by the Ministry, and in coordination with related agencies."*

In accordance with Article 34, the Board may issue specific instructions to regulate medical waste management in coordination with the MoH or other relevant institutions in a scientific way that prevents its threat to the environment and water resources. Therefore, it is crucial to develop a specific national law and regulation to prevent environmental pollution due to medical wastes, as the region does not have such a medical waste management law.

As the International Committee of the Red Cross (ICRC) explains, the amount of medical wastes depends on the national level of revenue and type of facility. To illustrate, the ICRC estimates that hospitals with a capacity of 100 beds will generate 1.5kg to 3kg waste per patient per day based on context, entailing all categories of medical wastes, including household waste.[377]

[377] ICRC, *Medical Waste Management*.

Moreover, the study noted that the MoH and the Health Directorate of Sulaymaniyah do not have clear and accurate data about the number of medical wastes. For instance, based on the data from the Infection Control Department under the Directorate of Health in Sulaymaniyah, there are about 50 to 60 tons of medical wastes collected every month in Sulaymaniyah, including 15 tons of wastes from private hospitals.[378] Another data[379] revealed that "Sulaymaniyah generates 70 tons of medical wastes monthly, 20 tons of which come from private hospitals, but their incinerators have the capacity to treat only about 30 tons every month".

In addition to the problem of medical waste in Sulaymaniyah, most private hospitals do not have medical waste treatments or incinerators. This is a problem because they generate about 20 tons of waste every month in the city and pay 2000 ID for each kg of waste to the government; they also burn their medical wastes using government incinerators. As the existing incinerators cannot receive all the generated medical wastes, about 70 tons in Sulaymaniyah city alone, the overloaded wastes are sent to landfills.[380] The city only has 6 machines for medical waste treatment, and only 4 of them work. Three are used for burning solid medical wastes and one is for blood waste treatment.[381] The lack of incinerators is a huge barrier to controlling medical wastes.[382]

Most health centers, hospitals, laboratories and other health-related services discharge their liquid medical wastes directly into the sewer system, which causes water

[378] Mohammed Mahwe, engineer from Health Directorate of Sulaymaniyah, Zheng parezy Program, Aryen Tv, March 27, 2021.
[379] Varen Tofeq.
[380] Mahwe.
[381]Ibid.
[382] Mahwe.
[382] Ibid.

pollution. Based on some reports, the lack of financial and technical support to the Health Directorate of Sulaymaniyah had accelerated medical waste risks to humans and the environment.[383] The burning of medical wastes using traditional incinerators causes environmental impacts such as air and land pollution.[384] The study inquired the Municipality[385] about medical waste management and its impacts on the Tanjero River, especially during the COVID-19 pandemic:

> "*The amount of medical wastes has increased due to COVID-19. Therefore, currently in Sulaymaniyah, medical wastes are not treated scientifically but rather put underground directly. Previously, public and private hospitals burned their medical wastes in a specific incinerator. Recently, they asked the Municipality of Sulaymaniyah to directly give them specific areas for landfilling these wastes. We know this process has negative environmental consequences as these wastes damage the soil and underground water.*"

As he mentioned, the capacity of existing incinerators is not enough to burn the increasing amount of wastes during the pandemic; hence, the medical wastes are buried underground despite the dire environmental consequences. Since late 2019, there has been growing attention on the importance of the proper management of healthcare wastes following the COVID-19 pandemic.[386] This is because improper handling of clinical wastes, especially during the COVID-19 pandemic, poses adverse effects to human health as well as to the environment. The current situation due to

[383] Ibid.
[384] Respondent 13.

[386], "Waste Management during the COVID-19 Pandemic from Response to Recovery", United Nations Environment Programme, August 2020, accessed June 15, 2021, https://reliefweb.int/sites/reliefweb.int/files/resources/WMC-19.pdf

COVID-19 has accelerated the problem of medical waste worldwide, including in the Kurdistan region.

However, the COVID-19 pandemic positively impacted the environment through decreased air pollution and environmental-related noise and greater biodiversity and tourist sites. Preventive measures on waste management increased at an accelerated rate.[387] Undeniably, medical waste generation would increase during any pandemic. The COVID-19 pandemic, for example, has caused an increase in medical waste generation, including swabs, syringes, needles, sharps, blood or body fluids, excretions, mixed wastes, laboratory wastes, material or equipment contaminated with the virus, masks and disposable gloves, and PPE that is used during the screening and treatment of COVID-19 infected persons.[388] Sustainable management of medical waste becomes problematic, particularly during emergencies like the COVID-19 pandemic. [389] The increased usage of face masks and disposable gloves led to more waste generation. Improper disposal of wastes in shop lots, rubbish bins and public areas also increased. The WHO recommended that all generated wastes from people infected with COVID-19 should be put safely in specific containers and bags, treated, disposed of, or treated safely. If the waste is moved off-site, it is critical to understand where and how it will be treated and destroyed safely.[390]

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[387] Samuel Asumadu Sarkodie and Phebe Asantewaa Owusu, "Impact of COVID-19 Pandemic on Waste Management", *Environment, Development and Sustainability* 23, No. 5 (2021): 7951–60, https://doi.org/10.1007/s10668-020-00956-y.
[388] P. Agamuthu and Jayanthi Barasarathi, "Clinical Waste Management under COVID-19 Scenario in Malaysia," *Waste Management and Research*, vol.39 no.1 (June 2021): 18-26, https://doi.org/10.1177/0734242X20959701.
[389] Hari Bhakta Sharma et al., "Challenges, Opportunities, and Innovations for Effective Solid Waste Management during and Post COVID-19 Pandemic", *Resources, Conservation and Recycling* 162, No. July (2020): 105052, https://doi.org/10.1016/j.resconrec.2020.105052.
[390] Agamuthu and Barasarathi, "Clinical Waste Management under COVID-19 Scenario in Malaysia,", 18.

Due to the novelty of the global COVID-19 pandemic, the existing waste facilities need to be developed to control the unusual amount of medical wastes and the associated viral spread. The necessary information needed includes the size of the medical waste generated, the hot spots for waste generation, and the available treatment facilities.[391] As mentioned earlier, the UN Basel Convention had developed a technical guideline called "*Technical Guidelines on the Environmentally Sound Management of Biomedical and Healthcare Wastes"*. This guideline includes information and practical aspects of waste management to assist the local authorities in minimizing hazards to human health and the environment.[392]

Even though there is no official data about the amount of medical waste generated in the region during COVID-19, there is no doubt that higher amounts of medical waste were generated during this time worldwide, including in the Kurdistan region.

Based on the discussion above, the legal framework for medical waste management is insufficient, whether before or during the COVID-19 pandemic. This is because no specific law or regulation exists to manage medical wastes completely based on international standards. Moreover, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq does not mention medical waste and its sustainable management. There is also a lack of modern technical equipment and sufficiently trained experts in public and private hospitals to treat all types of healthcare wastes using appropriate methods. The current situation with medical

[391] Sharma et al., "Challenges, Opportunities, and Innovations for Effective Solid Waste Management during and Post COVID-19 Pandemic."

[392] "Technical guidelines on the environmentally sound management of biomedical and health care wastes (Y1; Y3)", UNEP, accessed June 14, 2021, https://digitallibrary.un.org/record/475506?ln=en.

wastes is causing human diseases and environmental degradation. As mentioned above, medical wastes contributed to the Tanjero River pollution through the sewer system of private hospitals in Sulaymaniyah or via solid medical wastes dumped or landfilled nearby the river. Thus, it is crucial to develop specific medical waste management legislation for the region or amend the existing environmental legislation, such as Law No. 8 (2008) based on international guidelines and rules. It is also necessary to clarify the obligations of public and private medical institutions to have a proper medical waste treatment system in place to ensure that their wastes are not sent to landfills or managed in non-scientific ways.

Furthermore, it is crucial to increase the recycling rate of non-infected medical plastics (such as medical plastic packages and IV solution bags) and have proper source separation. Waste minimization via reusing, recycling, and source reduction must be supported, which also requires new regulations and guidelines.[393] COVID-19 has escalated the impact of such hazards on human health and the environment. Therefore, the MoH based on Law No. 15 (2007) for the Ministry of Health in Kurdistan Region of Iraq, has a legal responsibility to devise preventative measures to protect the public's health from transmissible diseases in the Kurdistan environment.[394] Furthermore, the law clearly mentions the coordination between the MoH and the EPI Board to protect and improve the environment and prevent pollution.[395] Therefore, this study analyzes the enforcement part and assesses the performance of relevant

[393] Yong Chul Jang et al., "Medical Waste Management in Korea", *Journal of Environmental Management* 80, no. 2 (2006): 107–15, https://doi.org/10.1016/j.jenvman.2005.08.018.
[394] Para 4 Article 2, Law No. 15 (2007) for Ministry of Health in Kurdistan Region of Iraq.
[395] Para 5 Article 2, Law No. 15 (2007) for Ministry of Health in Kurdistan Region of Iraq.

ministries and agencies in preventing river pollution based on their legal jurisdiction and responsibility.

With regards to medical waste, this study believes that the existing legal provisions are still inadequate to control or prevent river pollution due to medical wastes. Thus, the KRG should take instant steps to control medical wastes sustainably during a pandemic or normal situations by developing clear legal bases and standards to shift from traditional medical waste management to a more sustainable and modern system. It is a fact that the lack of enforcement of environmental rules and the WHO's standards in this regard had exacerbated the problem.

(c) River pollution by agricultural wastes

About 70% of the world's freshwater usage goes to the agriculture sector; however, water shortage and land degradation are expected to become serious barriers to the effort of increasing food production to meet future demands.[396] Wastes from the agriculture sector are one of the main pollutants of water resources in many countries, including Iraq. The same situation in China and EU member states is chiefly due to the high misuse of fertilizers and pesticides inter alia.[397] Even though China has progressed in its water management strategies, it is still facing some difficulties especially an insufficient legal framework to combat various types of water pollution from the agriculture sector, particularly animal wastes from livestock and poultry farms, and the high utilization and misuse of chemical fertilizers and pesticides.

[396] Vijay P. Singh et al., "Climate Change and Its Impact on Water Resources," from Handbook of Environmental Engineering, Volume 15:in *Modern Water Resources Engineering*, ed. L.K. Wang and C.T. Yang (New York: Springer Science+Business Media, 2014), 1–866, https://doi.org/10.1007/978-1-62703-595-8.

[397] Liping Dai, "Tackling Diffuse Water Pollution from Agriculture in China: Drawing Inspiration from the European Union", *Utrecht Law Review* 10, No. 2 (2014): 136–54, https://doi.org/10.18352/ulr.274.

Similarly, agricultural wastes contributed significantly to river pollution, such as the Tanjero River. This is due to the misuse of fertilizers and pesticides.[398] To examine the factors behind agricultural waste, the study interviewed water experts from the MoAWR and water activists regarding the impacts of agricultural wastes on the Tanjero River.

In terms of the management of agriculture in the region, respondent 3[399] emphasized the improper management of agricultural wastes:

> *"In Kurdistan, our rivers have been polluted by many human activities. The various industrial projects located nearby the river and agricultural activities also impact the water quality in our river, because the farmers misuse fertilizers and other pesticides. After raining, these chemicals seep through the catchment areas and reach the river. There are also lots of poultry farms near the river of which wastes cause river pollution."*

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In addition, respondent 10[400] also highlighted the impacts of agricultural activities on the Tanjero River:

> *"In Tanjero River, we have different agricultural wastes such as wastes from fish farms, misused fertilizers and pesticides for cultivating the lands, and other animal and poultry related wastes."*

Apart from that, farmers are not equipped with modern technology and training to practice the sustainable utilization of water resources and prevent river pollution. As respondent 10 mentioned, compared to other countries, Kurdistan still relies on the traditional water irrigation system, affecting water quality and quantity. While other

[398] Respondent 2.
[399] Respondent 3.
[400] Respondent 10.

countries, despite having limited water resources, have successfully managed their irrigation system. Respondent 10 added:

> *"Some countries such as Jordan, Israel, and the United Arab Kingdom, despite having limited water resources, still experience significant development in building modern irrigation systems."*[401]

Thus, the current situation nearby rivers is strong evidence that the Ministry is facing difficulties in its legal mandates based on Law No. 6 (2010), such as providing agricultural training for farmers, conducting scientific research in agricultural fields, and establishing effective government and private sector cooperation in developing agricultural and water resources. These main challenges should be resolved by forming a comprehensive legal framework and regulation.[402]

Based on the discussion above, different human-made factors such as industrial, municipal, medical and agricultural factors cause water resources pollution, particularly river pollution. Thereby, the current situation of water resources especially rivers requires comprehensive legal protection. In terms of the sufficiency of river protection under Law No. 8 (2008) in controlling these factors, respondent 7 (a member of the Kurdistan Parliament) said:

> *"Water resources entail a wide scope; therefore, a comprehensive law about water is needed or at least an amendment to the current Law No.8 (2008) for Environmental Protection and Improvement".*[403]

[401] Respondent 10.
[402] Ministry of Planning, "Regional Development Strategy for Kurdistan Region Report 2012-2016" (Erbil, 2012), http://www.mop.gov.krd/resources/MoP Files/PDF Files/gd_ps/regional_development_strategy.pdf.
[403] Respondent 7.

The existing provisions in Law No. 8 (2008) are not enough to control river pollution. There is also some ambiguity in this law regarding water resources. To illustrate, Law No. 8 (2008) for EPI only entails three articles namely Articles 22, 23 and 24, regarding water resources (as mentioned earlier), but with no exact definition. Thus, how can we prosecute polluters. Therefore, it is crucial to clarify the definition of water resources to develop water protection commitment, prevent pollution and water wastage, and so on.[404] It is important to clarify the concept of water resources in order to explain all the types of water resources and their usage.

It is necessary to define water resources in a way that includes all types of surface and underground water resources in the Kurdistan region. In addition, the meaning of water resources should include mineral water, bath water and treated polluted water. It is necessary to legally regulate the utilization of all types of water resources in order to clarify which of them require licensing for use, their right to use, the amount of utilization, or the purpose of their usage and so on.[405]

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Another issue is the ownership of water resources in Kurdistan. No text or provision determines the ownership of water resources, whether in Law No.8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq or Law No. 6 (2010) for the Ministry of Agriculture and Water Resources in Kurdistan Region of Iraq. Meanwhile, Iraq has decision No.408 (1976), which still applies in Iraq and Kurdistan. Based on this decision, spring water is considered public property, even if it is located on private land. This decision only refers to one type of water resource.

[404] Bahadin.
[405] Ibid.

Furthermore, in Kurdistan, drilling wells require a license by the MAWR based on Instruction No. 1 (2015), which indirectly means that underground water is considered public property and that no one can drill wells without a legal license. Therefore, it is crucial to explicitly determine that all surface and underground water resources are public property and that their usage requires a legal license.[406]

Another aspect that should be taken into serious consideration by the legislature is the water utilization concept. Similarly, the concept of water usage is not defined by Law No.8 (2008) EPI and Law No. 6 (2010) for the Ministry of Agriculture. Only Paragraph 1, Article 1 of Law No. 6 (2010) mentions the development of water utilization as one of the goals of the Ministry. Therefore, to enable access to clean and sufficient water for everyone as a human right, it is vital to clearly define the concept of water utilization for different sectors such as household, industry, agriculture, tourism, education, business, health and so on.[407]

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On the other hand, some scholars criticized Law No. 8 (2008) EPI because it does not take into meticulous consideration the features of Kurdistan's environment and natural resources. Respondent 4 said:[408]

> *"Law No.8 (2008) EPI is mostly taken from Jordan's environmental law, while Kurdistan's weather and environment are different from Jordan."*

Therefore, it is vitally important to develop water-related legislations in a way that takes into account the geographic, climate and water resources situation in the region

[406] Ibid.
[407] Ibid.
[408] Respondent 4.

rather than merely taking the legislations of other countries. The study, hence, examines Law No. 4 (2022) for Water Management and Protection of Kurdistan Region-Iraq.

3.4.4 The Law No. 4 (2022) for Water Management and Protection of Kurdistan Region-Iraq to prevent river pollution by industrial, sewer, municipal, medical and agricultural wastes

The study notes that Law No. 4 (2022) for Water Management and Protection of Kurdistan Region of Iraq, to some extent, is concerned about water pollution, including river pollution, caused by the human activities of all sectors, including the industrial sector. It is still too early to be tested empirically for its enforcement as the law was only recently applied on September 6, 2022 onwards.

Article 9 of the new water law states:

> *"Following activities are not allowed: Firstly: discharge of wastes from residential areas, industrial projects, agricultural and business projects, weapon wastes, healthcare wastes and other sectors' wastes into water resources, without necessary scientific treatment."*[409]

Based on the above article, it appears that the legislature combines different factors of water pollution, including industrial, municipal, sewerage, medical, and agricultural wastes. Although municipal, sewerage and medical wastes are not explicitly stated, both municipal and sewer wastes are mainly under household waste.

[409] Para 1, Article 9, Law No. 4 (2022) for Water Management and Protection of Kurdistan Region of Iraq.

In general, the Kurdistan legislature combines all types of water resources under the term "water resources" including river. Additionally, Paragraph 7 of the same Article clearly mentions the prohibition of factors that cause river pollution:

> *"The establishment of any projects, factories and residential area on the river, or river branches, lakes, water storage and surrounding lands within the determined boundary is not allowed without permission from the Ministry (MoAWR), except for water and sewerage projects."*

The rivers from the past to present have been facing massive pollution and environmental degradation due to permitting different projects on the rivers or surrounding area without considering their implications. For instance, in the case of the Tanjero and Serwan rivers, various industries, including mineral factories, performed quarry activities that severely damaged the rivers' quality and quantity. Furthermore, some master plans have been proposed by the municipal authority to develop projects for tourism and residential areas on the river basin of the Serwan river in Kalar city. This proposal has been met with severe criticism by environmentalists and NGOs due to the fact that these projects pose risks to the river and the surrounding biodiversity. Such projects could shift the river basin from public property to private property for specific wealthy people.[410] This contrasts with Article 3[411] of the water law, which indicates that water resources are public property. Therefore, the MoAWR should develop clear and comprehensive instructions to protect rivers and develop river basins as public property for the equal benefit of all, without any discrimination against poor people.

[410] GK Report , 2022. accessed on September 10, 2022. https://www.gksat.tv/video.aspx
[411] Law No.4(2022) for Water Management and Protection in Kurdistan Region of Iraq.

Article 9 is a pillar and positive contribution to the development of river protection in the region. Simultaneously, the legislature does not precisely identify all the existing factors of river pollution. For example, although it mentions water pollution by the oil industry, it overlooks the impact of the mineral industry such as quarry activities on rivers. Despite that, the provision is still applied to all industrial projects. It is better to include all wastes from different sectors contributing to river pollution because the legal provisions will assist the executive authority, i.e., the MoAWR to issue clear and sufficient regulations or instructions to control each waste.

According to the new water law, water utilization should be based on global standards and quality.[412] Although the provision does not specify which global standards should be followed for water usage by all the sectors, this issue should be clarified via specific instructions by the MoAWR.

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Furthermore, according to Paragraph 4, new projects should not be allowed without a proper waste treatment plant. As for existing legal projects that discharge their wastes into rivers or other water resources, the law provides them 6 months from the law enforcement date to build a waste treatment plant; otherwise, their license would be withdrawn. Paragraph 5, Article 11 states:

> *"Those projects that legally exist and discharge their wastes into the water resources are given a period of six months from the date of the enforcement of this law to build their waste treatment plant; otherwise, their license will be taken away."*[413]

[412] Para 1, Article 11.
[413] Para 5, Article 11, Law No. 4 (2022).

Here, two issues are unclear. Firstly, what would be the fate of existing illegal projects that discharge their wastes directly into rivers without any treatment? Secondly, the provision does not clearly mention the institution legally in charge of withdrawing the projects' license after the 6-month grace period.

Likewise, the law permits a 6-month grace period from the date of the law's enforcement for unlicensed agricultural, industrial, business and tourism projects to get a license from the MoAWR; otherwise, they are considered to be in violation of this law.[414] As stated in Paragraph 2, Article 16:

> *"It is a must for the beneficiaries of surface and underground water projects, who have no legal license, in the agricultural, industrial, trade and tourism sectors, to ask for the right of water benefits, and get permission from the ministry within six months from the date of enforcement of this law; otherwise, the beneficiary is considered as an offender of the rules of this law."*

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Here, it is a positive move to control the illegal drilling of wells, since there are many projects that use surface and underground water without any permission or license.[415] For example, based on a 2022 report, about 160 factories in the Garmian area have been illegally drilling wells to obtain potable water without any monitoring and license. However, it would be better not to limit the projects to only these four sectors since there are other forms of illegal welling or usage of underground or surface water by people or private sectors that also require attention and legal protection. Illegal drilling by people or investment projects in residential areas mainly involves using

[414] Para 2, Article 16, Law No. 4 (2022).
[415] "160 factories in Garmian area wastage potable water", DANG NET, 2022, accessed on September 10,2022.
https://dengnet.net/details.aspx?kodtech=21180&fbclid=IwAR1_zA1fT76dIvnwOzdAtk7LQ4GQGmRU5AU4GSiOJ1Q-2U5Kt2EKM-dklKo

underground water and not having wastewater treatment plants, which in turn causes a noticeable decrease of underground water level in the region.

3.5 Conclusion

Based on the discussion and analysis above, it is evident that different anthropogenic factors cause river pollution in the Kurdistan region, including industrial, oil, mining, quarry, sewerage, municipal, medical and agricultural pollution. Although the region has its own environmental legislations and institutions for water governance, the existing legal framework for river management does not provide the independent water agency with adequate legal authorities.

The existing legislations do not provide sufficient control for all types of waste and failed to deal with the current and upcoming climate change barriers. This is because the current legal situation is not adequate enough to overcome the water challenges from different sectors. The rivers, including Tanjero River have been polluted due to wastes from industrial. Sewerage, municipal, medical and agricultural activities. A stepping stone is urgently needed to provide robust river protection, i.e., by re-establishing a more comprehensive legal framework through the development of the current environmental and river-related provisions in Kurdistan to cover all aspects of river protection against human impacts.

Simultaneously, it is vital to develop a legal framework for water protection particularly in the region, to provide sufficient protection for rivers by creating adequate, clear and long-term sustainable water policy and planning. This chapter has answered the first research question and achieved the first research objective. The

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following chapter will evaluate the existing institutional framework for river protection in the region to highlight their weakness and challenges and determine whether they are sufficient to prevent river pollution in the region.

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CHAPTER FOUR

INSTITUTIONAL FRAMEWORK TO PREVENT RIVER POLLUTION IN KURDISTAN

4.1 Introduction

The institutional arrangement is a crucial segment of river protection as a part of water resources management. The study discusses the existing responsible institutions for river protection under the region's government. However, to answer research question two, the study mainly focused on the region's river governance by the Environmental Board (EPIB) and other relevant and responsible institutions based on their jurisdictions.

4.2 River Management under the Kurdistan Region Government (KRG)

The study will now discuss existing government agencies with legal responsibilities relevant to river protection under the KRG's structure.

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(a) Ministry of Environment in Kurdistan Region Government (MoE-KRG)

The Ministry of Environment (MoE) was established in the Kurdistan region based on Law No. 10 (2006).[416] The Minister was the chairman of the Environmental Protection and Improvement Council. This law gives a substantial role to the Ministry to protect and improve the environment.[417] It is authorized to suggest public environment policies to the council of ministries. Furthermore, the Ministry is empowered to issue environmental restrictions and requirements and monitor private projects with environmental impacts to ensure they follow environmental rules.[418]

After four years of the establishment of the independent MoE, the Ministry was annulled based on Law No. 11 (2009),[419] which was enacted to abolish and merge several ministries due to the financial crisis. The MoE was then replaced by the Environmental Protection and Improvement Board (EPIB) based on Law No. 3 (2010).

Eventually, based on Article 11 of Law No. 3 (2010), the term "Minister" in Law No. 8 (2008) was abolished and replaced by the term "Chairman" of the Board, and the MoE was abolished and replaced with the Board. This amendment was strongly criticized because the Ministry was more competent both administratively and financially in tackling environmental barriers in the region. The Ministry of Environment is definitely better than the Board in managing its functions through

[416] Law No. 10 (2006) for Environment Ministry in Kurdistan Region of Iraq, accessed July 25, 2020, https://www.parliament.krd/arabic/%D8%A3%D9%86%D8%B4%D8%B7%D8%A9-%D8%A7%D9%84%D8%A8%D8%B1%D9%84%D9%85%D8%A7%D9%86/%D8%A7%D9%84%D9%82%D9%88%D8%A7%D9%86%DB%8C%D9%86/%D8%A7%D9%84%D9%82%D9%88%D8%A7%D9%86%D9%8A%D9%86-2006

[417] Article 2.

[418] Article 5 of the Law No. 10 (2006) for the Ministry of Environment in Kurdistan Region of Iraq.

[419] Para 3, Article 1 of Law No.11 (2009) to abolish and merge some ministries. Accessed July 25, 2020, http://wiki.dorar-aliraq.net/iraqilaws/law/21220.html.

better law enforcement and coordination with other ministries. This is because the ministry has more power financially and administratively.

(b) Environmental Protection and Improvement Board (EPIB)

The EPIB was established in Kurdistan in accordance with Law No. 3 (2010).[420] It has a legal personality, with administrative and financial independence. Article 2 states:

> *"According to this law, a board will be established under the name of Iraqi-Kurdistan Environmental Protection and Improvement Board. It has its moral person, and independent finance and administration related to the presidency of the council of ministers administratively."*

It can be noted from the provision of Article 2 that there is a contradiction as it states: "It has its moral person, and independent finance and administration", simultaneously, as stated, "related to the presidency of the council of ministers administratively". This linkage with the presidency of council of ministries has an influence upon its financial and administration independence. However, financially and administratively, the Board faces several obstacles. To illustrate, some environmental fees paid to other ministries such as the MoI, MoFE and MoMT under environmental protection purposes return to the Ministry of Finance and Economy when they should be paid to the Board and become its income, as the Board is facing financial difficulties.[421]

This law provides some significant objectives to the Board; the main objectives are to maintain and enhance Kurdistan's environment and prevent pollution or other

[420] Law No. 3 (2010) of the Environmental Protection and Improvement Board (EPIB), accessed July 3, 2020, https://www.parliament.krd/english/parliament-activities/legislation/2010/

[421] Abdul Rahman Sadeeq, (Head of EPIB), interviewed by NRT Channel, June 28, 2021, https://nrttv.com/En/default.aspx.

activities that are dangerous for the ecosystem and human health.[422] Another critical goal is to eradicate and clean the effects of chemical weapons:

> *"Third: removing and treating the effect of chemical and explosive weapons in coordination with related agencies for cleaning minefields and the remainder of an ordinance which cause environmental pollution."*[423]

This is the outcome of Kurdistan's political history, which had faced humanitarian crimes and attacks, including chemical attacks, genocide against civilians, and other environmental destruction. Thus, this is an important point that needs to be taken into serious consideration particularly within the environmental context. Simultaneously, this process requires greater financial and technical efforts which is not easy for the Board. Nonetheless, the Iraqi Government should perform its duties in this regard to pay compensation to Kurdistan's nature after it had been destroyed as a consequence of the crimes committed by the former regime named "ANFAL" against the Kurds in their homeland, which damaged Kurdistan's environment including its southland villages,[424] lands, water resources, agriculture and others.[425] In addition, the Board has the mandate to improve public awareness, and education about environmental preservation and coordinate with NGOs and volunteers to conduct activities for educating people.[426] Environmental education is still not prioritized by the Board and other governmental institutions.

[422] Article 3, Law No. 3 (2010) Environmental Protection and Improvement Board in Kurdistan Region of Iraq.
[423] Article 3, objective 3.
[424] Based on some reports, 90% of Kurdistan's village and 10 small towns and cities have been destroyed completely. See: Anfal Campaign and Kurdish Genocide accessed on May 20, 2021, https://us.gov.krd/en/issues/anfal-campaign-and-kurdish-genocide/.
[425] Human Rights Watch, *Genocide in Iraq: The Anfal Campaign Against the Kurds* (New York: WRW,1993), accessed on May 21, 2021 https://www.hrw.org/reports/1993/iraqanfal/ANFALINT.htm
[426] Para 4, Article 3.

Moreover, in order to accomplish the mentioned objectives, the Board had legally authorized[427] the suggestion for a public policy on environmental protection and improvement to the council of ministries.[428] The Board could set up annual, medium-term, and long-term environmental planning.[429] Besides that, the Board has the authority to monitor the environmental influences of the projects by setting specific environmental requirements via the issuance of special instructions and by vesting these projects and testing their performance.[430]

Although this law gives some fundamental roles to the Board in proposing an environmental public policy and planning and issuing instructions to determine environmental restrictions and requirements for projects, it remains an oversight agency. Article 4 is poorly understood to render the Board qualified for handling multi-factor environmental challenges in Kurdistan, particularly to curb river pollution in the Kurdistan region. With regards to the legal status of the Board, one of the study respondents[431] , who is a member of the Kurdistan Parliament from the Committee of Health, Environment and Consumer Rights Affairs, said:

> *"The Environmental Protection and Improvement Board in Kurdistan is a monitoring and following-up agency. It does not have such power to enforce the law and regulation. The Board's power is given to other institutions or ministries; in other words, there are fragmentations of environmental-related powers. Therefore, all necessary powers relevant to environmental issues of projects must be given to the Board. The Board should have a special policy to enable it to enforce the law."*

[427] Based on Article 4 on Law No. 3 (2010) for Environmental Protection and Improvement Board.
[428] Para 1, Article 4.
[429] Para 2, Article 4.
[430] Para 3, Article 4.
[431] Respondent 7, Kurdistan Parliament member, Hawler, Iraq, Online interview by Google meet, Date of interview February 9, 2021, Wednesday, Time 12:15 AM.

Another interview respondent[432] who has 13 years of legal experience in the Board suggested the establishment of the MoE:

> *"It is better to make an independent ministry for the environment to overcome current problems. For instance, lots of people still do not know this Board exists. Despite that, there is poor coordination between the Board and other governmental institutions such as the Environment Peshmerge and Forest Policy."*

The Board and its directorates have shortcomings in terms of human resources. The study interviewed the Director of the Environment Protection and Improvement Directorate in Sulaymaniyah[433], who said:

> *"Every administration certainly has some shortcoming. For example, our Directorate also has some limitations, such as lack of staff, experts, technologies and financial support to perform our duties. Simultaneously, we are not negligent in our tasks."*

In terms of the Board's structure, Article 5[434] mentions the position of the head of the Board. The head of the Board (or Chairman) has significant roles financially, administratively, and technically. Therefore, it is better to revise some conditions or requirements to any person nominated for this position. For instance, among the pre-requirements are:

> *"He/she must hold at least a university degree and have experience and qualification in the field of his specialization."*[435]

Since some requirements, such as scientific knowledge and experience are crucial for the chairperson of the Board and its staff, the study believes that it would be better to

[432] Respondent 4.
[433] Respondent 5, Director of the Environment Protection and Improvement Administration of Sulaymaniyah, Sulaymaniyah, Iraq, face-to-face interview, date May 25, 2021, 9:45 AM, Kurdistan, Iraq.
[434] Law No. 3 (2010).
[435] Para 2, Article 5.

revise the requirements to clearly determine the number of years of experience (for example, at least 10 years) the field with a higher certificate. In addition, the Board has several significant departments with their respective tasks. Article 6 states:

> *"First: The board consists of the following departments and each department is directed by an employee with the post of director who has a preliminary university degree in the specialized field of the department and a number of employees cooperate with him/her:*
> *The Administrative, Financial and Legal Department*
> *The Environmental Awareness and Information Department*
> *The Department of Technical Affairs.*
> *Environmental departments in the regional governorates.*
> *Second: The Council of Ministers, in coordination with the Chairman of the Board, may start or merge or abolish any department within the formations of the board in accordance with its work requirements."*

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As can be noted in Paragraph 2 of Article 6, the Council of Ministers, with the Board itself, play the main role in amending the departments. Thus, it is preferable to enable the Board with enforcement powers in order for it to perform its tasks efficiently, including monitoring other ministries that may pose environmental challenges.

Additionally, Article 7 includes the establishment of the council of the Board, which consist of the representatives of 14 ministers as members, including the Ministry of Agricultural and Water Resources (MoAWR), the Ministry of Health (MoH), and the Ministry of Municipalities and Tourism (MoMT).[436] Furthermore, the Council also has

[436] Other ministries also have members in this council, which are: A-Ministry of interior, B-Ministry of Higher Education & Scientific Research, C-Ministry of Planning, D-Ministry of Health, E-Ministry of Trade and Industry, F-Ministry of Natural Resources, G-Ministry of Electricity, H-Ministry of Transport and Communications, I-Ministry of Education, J-Ministry of Peshmerga Affairs, K-Ministry of Culture and Youth, and L-Ministry of Endowment & Religious Affairs.

two experts in the field of environment protection nominated by the Chairman of the Board.

Although this provision requires the attendance of representatives from other ministries in a position not lower than a general manager, respondent 4 revealed that these ministries still do not comply with the law in this regard:

> *"The Board has the Council of Ministries' representative, headed by the Head of the EPIB, which is lower than a minister. Therefore, it is not easy to manage the Council. However, these ministries do not fully comply with Law No. 8 (2008) because sometimes their representatives do not attend or send their employees lower than a general manger to the meetings of the Council."*[437]

Notwithstanding, as mentioned earlier, based on Law No. 3 (2010), a committee called the Environmental Protection and Improvement Committee in Governorate (EPICG) is established in all regional governorates. It is headed by the governor, with members including the representatives of those ministries, as mentioned in Paragraph 1 of Article 7.[438] These EPICG also have members in the council of the EPIB.[439] However, until now, this EPICG has not been established in the region.

The council of EPIB holds monthly meetings and may organize urgent meetings if needed; the decision-making requires the majority of the present members. The chairperson of the Board can invite other agencies not linked to the ministries to participate in the Board's meeting without the right to vote.[440] Despite such allowance

[437] Respondent 4.
[438] Article 8, Law No. 3 (2010) Environmental Protection and Improvement Board in Kurdistan Region of Iraq.
[439] Para 1, Article 7.
[440] Para 2 and 3 of Article 7.

for other institutions to participate and coordinate with the Board, the coordination remains poor to date.

The annual report of the EPIB should be sent to the president of the Council of Ministries before it is announced.[441] Here, a question arises: if this report expresses environmental challenges or shows environmental problems caused by the ignorance of other government agencies or lack of coordination among some ministers, to what extent the Prime Minister or Council of Ministries would tolerate such revelations to be published, including criticisms of the government's policy and performance? Therefore, to avoid bias, it is better to give full freedom to the EPIB to publish its annual report or any other announcement about the situation of the environment in the region without obligating the Board to send this report to the Council of Ministries prior to publishing or any other restrictions.

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As such, it is necessary to revise the legal status of the Environmental Board in the region in tackling environmental problems. However, it is clear that water-related matters require the existing independent administration agency which enables the regulation of the water sector, censorship of its usage, issuance of water instructions, and enforcement of water-related laws.[442] Some legal experts and environmentalists call for the establishment of a special water Board named the Board of Water in Kurdistan Region[443] to manage water resources, including rivers.

[441] Para 3 of Article 7.
[442] Bahadin, Alan, The use of water resources from the legal perspective.
[443] Ibid.

This special water institution is suggested to be named "Water Board" or any other name. The recommended Water Board may have a council that includes water experts as members from relevant institutions, including the Ministry of Health, the Ministry of Natural Resources, the Ministry of Agriculture, the Environmental Protection and Improvement Board, and the Board of Investment. The Water Board will prepare the general water policy in KRI and set specific mechanisms to enforce the water policy, water resources management, licensing, censorship of water usage, and investment.[444] Undoubtedly, the establishment of such water institutions with independent executive authority requires the issuance of new laws and regulations by the Kurdistan Parliament because the value of water for the future of KRI is not lower than that of oil and gas, which has special laws and institutions in Kurdistan.[445]

(c) Ministry of Agriculture and Water Resources (MoAWR)

The MoAWR was established based on Law No. 6 (2010) for the Ministry of Agriculture and Water Resources.[446] Simultaneously, this law abolished both Law No. 1 (2007) for the Ministry of Agriculture and Law No. 9 (2006) for the Ministry of Water Resources.[447] Law No. 6 (2010) for the Ministry of Agriculture and Water Resources is relevant to river protection because the Ministry is responsible for enhancing agriculture and water resources in the region.

In accordance to Law No. 6 (2010), the Ministry has some significant roles and objectives, such as setting strategic plans and policies to invest and improve the water

[444] Ibid.
[445] Ibid.
[446] Law No. 6 (2010) for the Ministry of Agriculture and Water resources, accessed December 20, 2019, https://www.parliament.krd/english/parliament-activities/legislation/2010/.
[447] Para 1, Article 7 of Law No. 6 (2010) for the Ministry of Agriculture and Water Resources.

resources sectors. Furthermore, the MoAWR has other goals relevant to water protection from pollution by prioritizing environmental spheres based on international standards, coordinating with other ministries and international organizations, and establishing strategic projects using modern technologies to preserve water resources.[448] This provision may be developed to focus on sustainable agriculture management, water treatment plants to reuse wastewater for irrigation purposes, and elimination of agricultural wastes as the majority of fresh water is used for agricultural purposes. According to the UN,[449] 92% of fresh water in Iraq is used for irrigation and food production purposes.

However, the Ministry has the task to enhance human resources to rationalize the utilization of water resources, especially among farmers, by raising awareness and providing advanced technologies to develop the agricultural sector in the region.[450] Meanwhile, based on studies on the Tanjero River area, thousands of hectares of land are still cultivated annually using polluted water from the Tanjero River, which has been scientifically verified to have adverse impacts on human health via the consumption of the cultivated vegetables.[451]

The agriculture sector in Iraq, particularly in the region, is facing several obstacles which should be addressed, including the absence of proper agricultural waste usage,

[448] Article 2, Law No. 6 (2010).
[449] Requejo-Castro, Giné-Garriga, and Pérez-Foguet, "Data-Driven Bayesian Network Modelling to Explore the Relationships between SDG 6 and the 2030 Agenda".
[450] Para 14, Article 2, Law No. 6 (2010).
[451] Othman, "Environmental Health Assessment in Sulaymaniyah City and Vicinity"; Salwan S Al-hasnawi, "Water Quality Index Of Tanjero River Basin Near Sulaymania City", *Al- Mustansiriyah J. Sci.* 23, No. 8 (2012): 193–200; Aziz, Salah, and Hama-Salah, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District", Mustafa and Ahmad, "Nitrate Pollution in Groundwater of Sulaimaniyah City , Kurdistan Region , Ne Iraq".

inefficient agricultural training, lack of scientific research in agricultural fields, limited availability of water resources for agricultural purposes, inadequate water storage capacity, insufficient private and government role in developing agricultural sectors, and poorly regulated water use with significant water wastage due to unsustainable water utilization by the agricultural, industrial, and household sectors.[452]

Despite that, agricultural activities in Iraq, including the Kurdistan region, substantially contribute to river pollution. Some of the rivers are faced pollution due to agricultural wastes. For instance, The Tanjero River contains dangerous agricultural wastes that deteriorate water quality. One of the respondents[453] from the University of Sulaymaniyah conducted a scientific study on the Tanjero River area and noted the negative impacts of some agricultural activities on the river's water quality:

> *"Yes, agricultural activities cause pollution to the Tanjero River. This is because the farmers in the Tanjero area use Nitrogen as fertilizer. The Nitrogen may reach the underground water through the soil or the air to reach the river or other water resources, bringing dire impacts on the aquatic life and water plants. Likewise, chemical fertilizers damage water quality in the river and underground water. Pesticides or insecticides used to protect trees and vegetables also cause damage to the water quality of the Tanjero River."*

Based on respondent 2, it is clear that the MoAWR has encountered difficulties in managing the water resources and agricultural sector sustainably. Additionally, the out-of-date Iraqi agricultural laws, including those of the Kurdistan region, require reforms. Issuing a special law for farmers in the region is crucial to refurbish water

[452] Ministry of Planning, "Regional Development Strategy for Kurdistan Region Report 2012-2016,",77.
[453] Respondent 2, Assoc. Prof. University of Sulaymaniyah, Iraq, Online interview by Google meet, Date of interview: 19 February 2021, Friday ; Time 5:00 Pm.

resource infrastructures and encourage farmers to reuse their land by building a sustainable environment.[454]

Recently, on June 2, 2022, the Kurdistan Parliament passed a new water law called Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq. Although the new law attempts to shape a new legal frame for water management in the region by establishing the Water Council in the Region (WCR) and providing it with significant tasks, it is not sufficient enough to produce sustainable water management to face the various challenges in this era of climate change.

The study notes that water management remains mainly under the authority of the MoAWR. This is because the Minister of Agriculture and Water Resources is the president of the council, and the MoWR has majority of the council's staff. The MoAWR is responsible for preventing river pollution due to agricultural activities. For instance, the Tanjero River has been polluted by many factors, including the usage of pesticides by nearby farmers.[455] The new law clearly prohibits the usage of pesticides or any chemical materials to prevent agricultural disease, as these will cause water resources pollution.[456] Therefore, based on the new water Law No. 4(2022), the MoAWR is legally committed to tackle all illegal activities that cause river pollution, particularly those related to agricultural waste. Meanwhile, in the real situation, wastes from agricultural activities are considered one of the main river pollutants in many countries, including Iraq, specifically the Tanjero River, due to the misuse of fertilizers

[454] Heshmati and Auzer, "The Role of Natural Resources in Kurdistan Regional,", 8.
[455] Respondent 2.
[456] Para 6, Article 9, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.

and pesticides. Moreover, respondents 2, 3 and 10 highlighted the impact of agricultural activities on the water quality of the Tanjero River, which is polluted by wastes from fish farms, misuse of fertilizers and pesticides, and other animal and poultry-related wastes.

Based on the study investigation, Iraq and Kurdistan are facing water-related issues as a result of climate change, neighboring water projects in Turkey and Iran, and poor water storage infrastructure in Iraq. The MoAWR is facing challenges in supplying water for agricultural purposes, sustainable management of agricultural waste, and build-up of sufficient water storage capacity.

Respondent 10 mentioned that Kurdistan is still using traditional water irrigation systems, causing negative impacts on water quality and quantity. Despite limited water resources, other countries such as Jordan, Israel and the United Arab Kingdom are able to manage their irrigation system successfully. The respondent also mentioned about the damaging agricultural sector in the region due to its destruction of thousands of fish and other aquatic life in July and August due to industrial wastes from the Tanjero River area. The MoAWR has the responsibility to prevent such catastrophes.

Based on respondents 2, 3, 9, 10, 11, 12, and 13, the current situation of the Tanjero Rivers is clear evidence that the Ministry is encountering difficulties in performing its mandates based on Law No. 6 (2010) for the Ministry of Agriculture and Water Resources in Kurdistan Region of Iraq. For instance, the Ministry is not effectively and adequately providing agricultural training for farmers, conducting scientific research in agricultural fields, and establishing effective government and private sector

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cooperation to develop agriculture and water resources. Therefore, the MoAWR is responsible for river pollution, such as the Tanjero River, due to the lack of enforcement of the legal mechanisms and poor coordination between the MoAWR in the region and the MoWR in Baghdad as well as between the MoAWR and other relevant ministries and the EPI Board in the case of water management.

Moreover, some developments have been accomplished by the new water law compared to the previous Law No. 8 (2008). For example, Law No. 8 (2008) does not define water resources to include all types of surface and underground water; hence, it is necessary to legally regulate the utilization of all types of water resources, including mineral water, bath water and treated polluted water to clarify which of them require a license prior to usage, or which of them should be considered to have the right to be used, or the amount that should be utilized, or the determination of the purpose of their usage and so on.[457] This issue has been solved within the new water law,[458] since the law defines water resources in Article 1:

> *"Water resources include all surface, underground water with its all resources, heavy water and sewer water after their treatment."*[459]

Additionally, none of the provisions determine the water resources ownership concept, whether Law No. 8 (2008) for EPI or Law No. 6 (2010) for the Ministry of Agriculture and Water Resources. Meanwhile, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq comes with a provision that considers water as

[457] Bahadin.
[458] Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[459] Para 9, Article 1, Law No. 4 (2022).

a national fortune and a public property, which needs a license for its utilization based on the rules of this law.[460]

Similarly, to enable access to clean and sufficient water for everyone as a human right, it is vital to clearly define the water utilization concept for different sectors such as the household, industrial, agricultural, tourism, education, business, and health sectors.[461] This is because the concept of water usage is not defined under Law No.8 (2008) for EPI and Law No. 6 (2010) for the Ministry of Agriculture.

In this regard, the new water law has a provision that categorizes water utilization based on priority into different sectors, namely:

> *"1. Drinking and using it for service purposes. 2.Animals and fishing purposes. 3. Irrigation and agricultural purposes. 4. Industrial purposes and electricity generation. 5. Environmental and tourism purposes. 6. Investment purposes."*[462]

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Law No. 10 (2012) for Forest in Kurdistan Region of Iraq prohibits activities in the forest area unless with the approval of the MoAWR. One example is the establishment of public or private facilities within the forest area, whether temporarily or permanently.[463] It also does not allow the building of dams or barriers, the shifting of the river's direction which passes across the forest, the establishing of quarry projects, or the extracting and transporting of rocks, trees and soil.[464] This law is currently being violated by the quarry factory nearby the Tanjero and Serwan Rivers. The natural

[460] Article 3, Law No. 4 (2022).
[461] Bahadin.
[462] Para 1, Article 5, Law No. 4 (2022).
[463] Point 3, Para 3, Article 4.
[464] Point 9, 10, Para3, Article 4. Law No. 10 (2012) For Forest in Kurdistan Region of Iraq.

forest in the river basin is facing deforestation and alteration of the river's direction due to the development of dams or holes to produce raw materials for the quarry's production purposes.

The MoAWR is also responsible for protecting the underground water, polluted in the Tanjero River area as respondents 2 and 12 mentioned. According to Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq and Instruction No. 1 (2015), drilling requires a license from the MoAWR. Respondent 12 emphasized that the illegal drilling of wells is another challenge impacting the underground water quality and quantity in the Tanjero area and other places as well. He also mentioned that the Directorate of Underground Water in Sulaymaniyah, which is under the MoAWR, still has poor human, technical and financial support in managing its tasks efficiently.

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Based on the above and the roles given to the MoAWR in Law No. 4 (2022) for Water Management and Protection of Kurdistan Region-Iraq, the Ministry is legally committed to protecting river water quality and quantity. But the Ministry is still showing poor performance in enforcing the legal mechanisms for protecting natural resources such as rivers, underground water, and forests in the region, including in the Tanjero River, among others.

(d) Water Council in the Region (WCR)

It is crucial to overcome the existing water fragmentation and overlapping responsibility, which lead to poor coordination and enforcement. As mentioned earlier,

some scholars recommend establishing a special water board in Kurdistan.[465] They suggested bringing back certain water departments from other institutions to this proposed water agency, such as the Directorate of Dams and Water Stores and the Directorate of Water Resources from the MoAWR, the General Directorate of Water and Sewage from the MoTM, and the General Directorate of Weather and Seismology from the Ministry of Transportation.[466]

Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq established a new water council called the Water Council in the Region (WCR). However, it is not an independent water agency since it is located at the heart of the MoAWR.

Based on Paragraph 1 of Article 7, the Minister of Agriculture and Water Resources is the president of the Water Council. The Council also has 6 other members from the MoAWR. Another two institutions participate as council members, namely the Head of the Environmental and Protection Board and the General Manager of the Water and Sewerage System from the Ministry of Municipality and Tourism (MoMT).[467] But the study noted that some other sectors that are highly pertinent to the water sector did not become a member of this Council, including the Ministry of Trade and Industry (MoTI) and the Investment Board in Kurdistan Region of Iraq (IB). As the industry and investment sectors have remarkable impacts on the region's water resources, these institutions should have clear roles and contribution through the WCR to prevent or control the current status of river pollution in the region.

[465] Bahadin.
[466] Ibid.
[467] Para 1, Article 7.

In addition, based on Paragraph 2 of Article 7, several general managers who act as representatives of other ministries in the KRG participate in the council meeting without having the right to vote, namely the Ministry of Planning (MoP), the Ministry of Electric (MoE), the Ministry of Interior (MoI), and the Ministry of Health (MoH). This new water law also requires coordination between the MoAWR and other ministries and institutions. According to Part 3 of the new water law entitled "Water Resources Management", the MoAWR should perform some tasks, including preparing a plan for water resources and its project management in coordination with other ministries, establishing capacity development in water resources management, and planning for water resources development in coordination with governmental institutions with the participation of the population, non-governmental organizations (NGOs), and the private sector.[468] Furthermore, the MoAWR should coordinate with relevant ministries, NGOs and the media to raise awareness about the importance of water in education programs.[469] Most of these tasks were previously highlighted in Law No.6 (2010) of the Ministry of Agriculture and Water Resources in Kurdistan Region of Iraq.[470]

To manage all these tasks, the legislature requires coordination with other ministries. However, the structure of the Water Council does not include members from other ministries except for the MoMT and the EPI Board. On top of that, four representatives from other ministries (i.e., the MoP, MoE, MoI and MoH) are not provided with roles

[468] Para 1, 2 and 3, Article 6, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[469] Para 4, Article 6, Law No. 4 (2022).
[470] Article 3.

as a policymaker or contributor in water resources management through the council since they have no right to vote.

Article 8 states the duties of the Water Council, including internal water policy planning, approving of water utilization by all sectors, decision-making on water resources project, decision-making on water resources investment planning, decision-making on national strategy about the climate, decision-making on the plan to divide water for different sectors, allocating of special budgets to develop water projects such as huge and medium-sized dams, adopting of modern water irrigation system for the development of agricultural production, and lastly planning to combat drought, floods and water resources pollution in coordination with other relevant institutions.[471]

As seen here, the law gives significant commitment to the Water Council to manage these tasks successfully with effective coordination with other ministries due to the nature of water, particularly in combating water pollution, as mentioned in Paragraph 9, Article 8. Therefore, the study believes that this issue should be taken into consideration by the legislature.

(e) Ministerial responsibilities to protect the river

As the study noted in the previous chapter, the Tanjero River has been polluted by various types of wastes from different sectors, including the industrial, oil, mining, municipality, health and agricultural sectors, which are managed by different ministries in the KRG. Therefore, the study will examine the legal responsibility of

[471] Para 1, 2, 3, 4, 5, 6, 7, 8 and 9, Article 8.

these ministries to enforce the available mechanisms based on their legal authority regarding the current factors of pollution in the case of the Tanjero River.

Based on Article 15 of Law No. 8 (2008) of EPI, all other relevant ministries and institutions must coordinate with the Ministry of Environment (replaced by the Board) before giving any permission or license to any project in order to prevent environmental harm from the activities under their supervision or license. To do so, should these ministries monitor the availability of environmental requirements in these projects under their authority, further coordination with the board is required regarding these strategic projects with environmental impacts. Thus, based on sectoral factors, the study examines the role of each relevant ministry or institution according to their jurisdiction in river protection.

(i) Ministry of Trade and Industry (MoTI)

As discussed earlier, industrial wastes cause serious river pollution. For instance, pollution of the Tanjero River occurs due to oil, quarry, and iron mining activities, among others. According to Law No. 10 (2010) for the Ministry of Trade and Industry in Kurdistan Region of Iraq, the ministry has the legal responsibility to create and enforce a general policy for the industrial and trade sector in the region to accomplish economic and social development. Simultaneously, it is responsible for implementing other provided tasks based on other enforceable legislations in the region.[472] Therefore, the ministry has the legal authority to supervise industrial and business activities through some enforceable mechanisms, particularly by giving licenses based on certain requirements, including environmental conditions, monitoring them, and imposing penalties if the rules of law are violated.

[472] Article 2, Law No. 10 (2010) for the Ministry of Trade and Industry in Kurdistan Region of Iraq.

MoTI has the legal responsibility to prepare annual, medium- and long-term planning and study for industrial projects, monitor industrial activities and direct them regarding the quality of performance and their impacts on the environment via enforcement mechanisms such as permission (licenses).[473] The Ministry has the authority to establish industrial areas or permit the private sector to build an industrial area.[474]

Although this law does not clearly mention any environmental aspect, it may be under the technical feasibility (Paragraph 6, Article 3). Thus, there is a need for a clear delineation of environmental protection under Law No. 10 (2010) for the Ministry of Trade and Industry. However, the study agrees with respondents 1 and 6, who believe that this law is not seriously concerned about the protection of the environment in trade and industrial projects. The current situation of the Tanjero River is strong evidence that the MoIT does not properly manage its tasks based on the authority provided under Law No. 10 (2010) due to the lack of enforcement of environmental-related rules and poor coordination with institutions such as the EPI Board in this regard.

(ii) Ministry of Natural Resources (MoNR)

Oil activities and quarries which had affected the surface and ground waters especially in rivers. These activities are under the supervision and authority of the MONR in the region, based on Law No. 21 (2007) for the Ministry of Natural Resources in Kurdistan Region of Iraq, Oil and Gas Law No. 22 (2007) of the Kurdistan Region of Iraq, and other applicable laws.

[473] Para 6, Article 3.
[474] Para 7 and 8, Article 3.

From the discussion with respondents and evidences, it is clear that the MoNR had neglected its legal commitment to protect the environment, including rivers, from harm and pollution due to oil and gas activities.[475] Meanwhile, based on Article 30 of Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq, the EPI Board, in coordination with other related institutions, including the MoNR prepares environmental conditions for some activities such as exploration, mining, quarries, smasher, washers, mines, and extraction of petroleum resources from pollution and depletion. However, such regulation for oil and gas projects does not exist in the region, as mentioned in Chapter 3.

Currently, oil projects are causing river pollution in the case of the Tanjero River and other rivers in the region (such as the Great Zab River) and in the middle and south of Iraq (such as the Euphrates River).[476] Furthermore, regarding the Tanjero River (among others) respondents 9, 10, and 11 confirmed that the Tanjero River pollution is due to illegal oil activities in the Tanjero area. These respondents mentioned the responsibility of the MoNR and its poor enforcement of environmental legislations as a result of prioritizing the development of the oil and gas industry over environmental protection. Respondent 10 mentioned that 27 illegal oil projects nearby the Tanjero River discharge their liquid wastes into the river without any pretreatment, thus causing deteriorating water quality in the river and posing risks for humans, animals and all biodiversity there.

[475] Shwan Omer, Khudhur Safaa, and Aldden Mohammed, "Penal Protection of Environment from Oil Operators Pollutants A Study in Light of Punitive Legislation in Kurdistan Region – Iraq", 2019, 183–90.

[476] Aziz, M. Salih, and Hama-Salah, "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District", 69.

One of the parliament members[477] also emphasized the illegal industrial activities nearby the Tanjero River, including oil refiners, as a factor causing pollution to the Darbandikhan Dam, which is the source of drinking water for about 500,000 people in Darbandikhan town.

Similarly, Hama Salah[478] in his report (as mentioned earlier)to the president of Parliament No. 25 on April 28, 2021, indicated the problem of low-quality but highly-priced fuel and gas in the region. This parliament member claimed that the illegal oil refiners produce poor-quality fuel and gas, thus causing health hazards. He recommended the employment of legal oil refiners to supply oil and gas for the people at an acceptable quality and affordable price. Therefore, it is evident that the MoNR has not enforced the environmental requirements properly on the oil and gas industry, seeing that many oil activities discharge their wastes into the environment, including water resources, without having legal permission from the ministry.

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With regards to the responsibility of the MoNR and MoAWR in Parliament, respondent 4 (parliament member) believes that the parliament as an oversight agency plays a positive role in reporting environmental cases. However, the government is responsible for enforcing the law. He mentioned that the parliament previously attempted to invite the MoNR and MoAWR to parliament, but they either did not respond or did not take any responsibility despite attending. Hence, law enforcement is the barrier to protecting and developing water resources in the region. The

[477] Hama Salah, April 21, 2021.
[478] Hama Salah, Ali, Report No. 25, April 28, 2021.

respondent also refers to the interference of political parties in the government as a barrier to the implementation of the law.

Respondents 1 and 3 highlighted the responsibility of the parliament in enforcing water-related laws to preserve rivers. They emphasized the legal responsibility of the parliament in taking legal actions such as monitoring, prosecuting and investigating through legal mechanisms such as queries or, interrogation or withdrawal of trust from the responsible minister. They also criticized the parliament for the absence of a specific water law.

Law No. 22 (2007) for Oil and Gas in Kurdistan Region of Iraq authorizes the MoNR to enact specific environmental regulations to protect the environment from the impacts of oil and gas projects in Kurdistan, but a specific environmental regulation for controlling oil pollution does not exist.[479] The law authorizes the MoNR to manage the oil and gas sector in an environmentally-sound manner to minimize its undesirable consequences on Kurdistan's natural resources.[480]

Additionally, as mentioned earlier, Kurdistan's Production Sharing Contracts (PSC) emphasize protecting the environment by international oil companies.[481] Unfortunately, these provisions remain unimplemented by the ministry. On the other hand, the Board faced difficulties preventing oil pollution due to its poor legal status, mainly concerning overseeing environmental cases, as mentioned earlier. In other

[479] Othman, "Legal and Ethical Obligations of Oil Companies in Preserving Natural Environment; a Case Study of the Kurdistan Regional Government's Production Sharing Contracts": 394.
[480] Para two, Article 7 Oil and Gas Law No. 22 (2007) of the Kurdistan Region of Iraq.
[481] Article 37/1.7 Oil and Gas Law No. 22 (2007) of the Kurdistan Region of Iraq.

words, the Board does not have such enforcement power. The MoNR is also not properly coordinated with the Board in this regard.

The MoNR is also responsible for river pollution due to poor enforcement of environmental rules and standards on mining activities, such as the Tanjero River quarry factory. Law No. 91 (1988) for Regulation of the Mineral Investment of Iraq is enforceable in the KRI. As explained in Chapter 3, the main objective of the Law is to apply the scientific method and comprehensive supervision of mineral investment to guarantee high-quality investments by the public and private sectors from the mineral sector, along with environmental and natural resource protection. Furthermore, Law No. 91 (1988) attempts to establish certain mechanisms to prevent the negative impacts of quarries.

Despite having mechanisms for preventing or minimizing the environmental consequences of such activities, these provisions have an ambiguous stance about environmental protection compared to its effects on the surrounding environment. For instance, despite mentioning environmental elements such as forests, dams, and agricultural lands, there is no explicit provision for protecting rivers from the impacts of mineral activities when most of these projects exist nearby rivers such as the Tanjero, Great Zab and Serwan rivers. As it has been more than three decades since the issuance of Law No. 91 (1988), it is now out-of-date for the current industrial situation and thus requires more development and effective enforcement in this regard. Apart from that, existing mineral and quarry activities do not follow waste management rules and environmental conditions. For instance, based on Instruction No. 3, 2022, mineral and quarry projects should filter and treat their wastes, including

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wastewater, before releasing them to the surrounding environment. This instruction also requires the projects to have 25% green area out of the whole project site.[482] However, these activities do not currently respect the required environmental conditions, particularly those operating near the Tanjero and Serwan rivers.

Other than violating the rules of Law No. 91 (1988) for the Regulation of Mineral Investment, quarry activities also violate Law No. 3 of (2018) for Preventing Overtaking in Kurdistan Region as these activities in the river basin area do not adhere to their permitted boundary; they overtake and over-exploit the river basin by shifting its direction and making dams or deep holes.[483]

As mentioned earlier, the DoOMG does not impose penalties for the violation of environmental rules by quarry or other mining activities in one hand. On the other hand, the Director of DoOMG only has 3 employees for monitoring these mining projects.[484] Therefore, the DoOMG is not properly equipped with human resources to control mineral activities, including quarry activities near the river.

Respondents 3 and 10 mentioned that the quarry activities cause damage to the river by shifting its direction, thus posing risks to the aquatic life and biodiversity nearby the river. The investors do not comply with their legal duty to resolve the deep holes or other dangers in their surrounding area, which sometimes cause death risk for people swimming in the river. Simultaneously, the board does not authorize supervision of

[482] Point 5, Paragraph 1, Article 4, Instruction No. 3/2022 for Classifying Projects and Environmental Consents in Kurdistan region of Iraq.
[483] Respondents (3 and 10).
[484] Fatah, Yadgar, Directorate of Oil and Mining of Garmian, Report of 2020, Kurdistan TV, 12 January 2021.

the quarry factory and rigorously implements the environmental requirements upon every project near rivers such as the Tanjero and Serwan rivers. Thus, it is critical to improve the provisions of Law No. 91 of (1988) for the Regulation of Mineral Investment, since the current version does not include adequate and clear provisions to control river damage caused by mineral activities, particularly quarry projects in the Tanjero and Serwan rivers. Likewise, it is necessary to authorize the EPI Board to monitor and enforce the environmental rules in mining activities.

Furthermore, the DoOMG does not properly or rigorously respond to the environmental harms caused by these activities because based on Law No. 91 (1988), the DOMG may only interfere if the factory's practice goes beyond the permitted area and not for environmental violations such as the changing of river direction, deforestation and water pollution. Respondents 3 and 10 highlighted that poor coordination between the MoNR, MoAWR and the Board is another considerable obstacle that causes more degradation to the Tanjero and Serwan rivers because the MoNR is not concerned about environmental impacts.

(iii) Ministry of Municipality and Tourism (MoMT)

As previously discussed, municipality wastes are polluting rivers, particularly in the Tanjero River, due to improper management of municipal wastes, including solid and sewerage wastes in Sulaymaniyah city. Therefore, the study highlights the legal responsibility of the ministry regarding the poor quality of municipality services.

Based on Law No. 12 (2010) of the Ministry of Municipality and Tourism in Kurdistan Region of Iraq (MoMT), and new issued law for the Ministry of Municipality and Tourism named "Law No.7(2022) for the Ministry of Municipality and Tourism in

Kurdistan region of Iraq" which replaced Law No.12(2010), some of the objectives and responsibilities of the Ministry is relevant to the municipality and tourism services include providing access to clean drinking water, building a sewer system to collect household wastewater and drainage, and establishing wastewater treatment plants, among others.[485]

However, in reality, the region still has poor municipality and tourism services. As mentioned in the previous chapter, based on the report by MoMT, about 50% to 60% of distributed drinking water had been lost due to water leakages and illegal private connections to the public grid.[486] This means that the ministry is facing difficulties in enforcing the law and preventing illegal water connections.

Furthermore, as highlighted earlier, the region produces 2,600,000m3 drinking water daily. Out of this volume, 850,000 m3 is wasted every day, costing the government about 340 million IDs daily.[487] Moreover, there are still no sewerage treatment plants in the region on top of poor or incomplete sewer infrastructure and collectors. Therefore, sewer waste is another fundamental source of river pollution, particularly for the Tanjero River. Sewerage wastewater from Sulaymaniyah city is collected through a wide network of pipes connected to 19 underground concert boxes. These box channels transport wastewater outside the city, which later flows in the field like a stream. Fourteen of these boxes flow into the Tanjero River in Sarchinar. In contrast, some of the open boxes are located inside the new master plan of the city, which

[485] Para 1, Article 2, Law No. 12 (2010) of the Ministry of Municipality and Tourism in Kurdistan Region of Iraq.
[486] Tinti, 3.
[487] STOP Organization for Monitoring and Development and MULK NEWS Media, *Analytical and assessment report: Threats of declining underground water level in Hawler*, 2.

currently consists of residential areas, including the Kani Goma village and other urban residential areas. The sewage wastewater causes the Tanjero River to be polluted with heavy metals such as Fe, Mn, Ni, and Cr, due to the lack of water treatment before being discharged into the river.[488]

Respondent 13 said that other than sewer wastes from households in the city, several industries also produce water wastes and discharge them directly into the Tanjero River. Respondent 13[489] , Director of the Service Department of Sulaymaniyah Municipality, mentioned that sewer waste makes up about 60% of the wastes dumped into the Tanjero River.

This shows the region has poor water services, including water network and sewer waste infrastructure. Therefore, comprehensive legal protection of water resources is needed, including regulating and managing sewer system infrastructure. The water institution should be legally authorized to manage public and private sewerage systems, including their establishment and development. Furthermore, it is also necessary to regulate a private sewer system for trade effluent. Some countries consider these issues because waste discharges by industries and other private agencies significantly impact surface and ground water quality (such as the Tanjero River). For example, Singapore is among the countries with special laws for sewerage and drainage systems. [490]

[488] Nizar Y. Hama-Salh, Nigar A. Aziz, and Sabah M. Salih "Pollution of Tanjero River by Some Heavy Metals Generated from Sewage Wastewater and Industrial Wastewater in Sulaimani District.", 71.
[489] Respondent 13.
[490] Cecilia Tortajada & Joost Buurman, "Water Policy in Singapore," n.d., 1–11, http://global-is-asian.nus.edu.sg/index.php/water-policy-singapore/

Meanwhile, the Kurdistan region is facing critical barriers related to the management of its sewer system due to poor sewerage infrastructure, inadequate collectors, and the absence of sewerage wastewater treatment plants. Although sewerage waste has critical impacts on the region's water resources, Law No. 12 (2010) of the Ministry of Municipality and Tourism in Kurdistan Region of Iraq and Law No. 8 (2008) for Environmental Protection and Improvement in the Kurdistan Region of Iraq and even new Law No.7(2022) for MoMT do not include clear mechanisms about sewer systems or the prevention of river pollution due to sewerage wastes whether from private or public sewer systems.

In addition, Law No. 3 (2010) of the Environmental Protection and Improvement Board in Kurdistan Region of Iraq does not authorize the Board to be an administrative agency for sewerage and drainage systems. While some countries like Singapore put the management of their sewer and drainage systems under independent water agencies, Kurdistan does not have any independent water institutions. Its water management is still fragmented and managed under different institutions based on different legislations.

The MoMT manages the public sewerage systems in Kurdistan as the Ministry has a specific department of sewerage systems called the General Directorate of Water and Sewage.[491] However, there is ambiguousness in terms of its private sewer systems as the law does not explicitly tell us whether or not the Ministry is responsible for private sewerage systems since the law does not differentiate between private and public sewerage systems. Meanwhile, based on Law No. 12 (2010) and Law No.7(2022), it

[491] Para 5, Article 3, the Law No. 12 (2010).

could be understood that the MoMT is responsible for all the public or private sewer sectors. Hence, this problematic issue should be addressed because private industries discharge their wastewater without treatment into the public sewer system and cause water pollution to the Tanjero River, among others. Moreover, some private industries are not even connected to the public sewerage system.

Therefore, it is necessary to develop the law to clarify the obligation of the private sector in building their own sewer system and treatment plants (as part of their license), or pay the cost of sewer establishment and development. Simultaneously, the current situation requires effective enforcement of the environmental requirements, particularly the financial and non-financial administrative penalties upon industries that neglect this duty, such as those operating in the Tanjero River area. Thus, the MoMT is responsible in this regard to enforce the law on existing industries nearby the Tanjero River to environmentally manage their sewer wastes. To do so, efficient coordination between the MoMT and other governmental agencies, such as the Board, is highly essential.

In terms of the Tanjero River pollution due to municipal wastes such as solid wastes, from the previous discussion, it is clear that the MoMT is not successful in managing solid wastes. The Tanjero River pollution is also the result of waste disposal nearby the river basin. This indicates that the Municipality of Sulaymaniyah has failed to manage wastes in the Tanjero River. Furthermore, it is clear from the study that one of the critical solutions for solid waste is the development of a modern recycling factory, as suggested by respondent 13.

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According to the study data, the new treatment factory (MBT) has the capacity to treat about 1200 tons of municipal solid waste every day; meanwhile, the city generates about 1850 tons of solid waste daily. This factory currently does not have the capacity to cover all the generated wastes, which continues to increase due to industrial and population development. Furthermore, this project is unable to recycle some wastes such as medical, sewer, construction and building wastes.[492] The sustainable management of solid waste requires advanced technology to treat or recycle all the different wastes and to prevent their hazardous consequences. Respondent 13 mentioned that the dumping of municipal wastes from Sulaymaniyah city near the Tanjero River without a proper recycling system or landfilling poses risks to human health and causes biodiversity loss and river pollution.[493] This is another evidence of the poor performance of the MoMT in effectively managing its legal tasks based on Law No. 10 (2010) and new Law No.7(2022) for the MoMT and other related legislations.

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In addition, respondents 1, 6 and 13 emphasized the necessity of cooperation among different governmental institutions in water management, such as in the case of the Tanjero River, as he believes that the MoAWR, EPI Board and MoMT should take responsibility for tackling the water challenges in Iraq and the region. However, he claimed that other ministries are also responsible for the Tanjero River, including the MoTI and MoH. Therefore, he suggested that those ministries establish better coordination with the Municipality via regular meetings and conferences.

[492] Twana Jafer, Legal Ranj Program, Rudaw Tv.
[493] Othman, "*Environmental Health Assessment in Sulaymaniyah City and Vicinity*", 31.

The MoMT is still facing problems in managing municipal waste in a sustainable manner, such as in the case of the Tanjero River. This is the outcome of poor enforcement of environmental legislations, the lack of a proper recycling and treatment system, and poor coordination between the municipality authority and other institutions.

(iv) Ministry of Health (MoH)

The Ministry of Health (MoH) is also responsible for river pollution, including Tanjero River. As previously discussed in the study, the mismanagement of medical wastes, health risks, and the spread of water-related diseases in Tanjero and Darbandikhan town had caused pollution to the river; hence, the river water is not suitable for drinking and human usage according to some studies and reports.[494]

In addition, the MoH does not manage the medical waste in the region in a scientific manner. For instance, in the case of the Tanjero River, some of the international standards under the supervision of the United Nations Environment Program (UNEP), the WHO and the Basel Convention 1989 regarding the management of hazardous wastes, including medical waste, have not been enforced properly.

Every member party in the Basel Convention should issue proper national legislation to prevent and penalize the illegal trafficking of hazardous and other wastes. Each member must ensure that hazardous and other wastes are managed and disposed of in an environmentally-friendly way. Although Iraq had approved the Convention on May

[494] Hama Salah, April 21, 2021.

2, 2011, and entered into force on July 31, 2011,[495] medical wastes are still not managed safely until today.

Based on a 2018 report, 75% of medical wastes from local hospitals in Sulaymaniyah city are disposed of in the Tanjero River area in the southern part of the city.[496] Possible exposure may occur through direct contact, airborne transmission, contaminated water and the environment in general.[497]

Respondents 2, 9, 10, 13 and 15 confirmed the dumping of medical wastes nearby the Tanjero River. Respondent 9 claimed that eight private hospitals discharge their medical wastes (including cancer waste, body parts and expired medicine) into the Tanjero River via private companies instead of burning them in a designated burner. This respondent argued that he has evidence that the medical laboratories in these hospitals also discharge their liquid wastes, including blood, in a non-scientific way into the sewer system.

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In addition, based on Instruction No. 3 (2022),[498] health institutions and activities such as hospitals, clinics, and laboratory centers are listed under category "A", which requires them to attain environmental consent and to perform an EIA study prior to starting their activities so as to ensure environmental protection. These health-related institutions should take certain measures to prevent water pollution, such as filtering utilized water from the laboratory and treating wastewater before discharging them

[495] BASEL, Waste management an essential public service in the fight to beat COVID-19
[496] Environmental Justice Atlas, Solid waste dumpsite in Sulaymaniyah, Kurdistan Region of Iraq, accessed 9 June, 2021, https://ejatlas.org/conflict/dump-site-in-sulaymaniyah-kurdistan-region-of-iraq.
[497] Shareefdeen, "Medical Waste Management and Control", 1626.
[498] Instruction No. 3 (2022) for Classifying Projects and Environmental Consents in Kurdistan Region of Iraq.

into the sewer system. However, non-hazardous solid wastes and other municipal wastes should be sent to landfills. However, landfilling is not a sustainable way for managing wastes. Meanwhile, other medical wastes such as laboratory equipment and surgical materials should be treated using autoclaves and microwave machines in hospitals. Wastes such as human body parts should be treated using systematic incinerators. On top of that, these health institutions should dedicate at least 25% of their entire operating area to become a green area (Paragraph 3, Article 3). As the study noted, these rules are not enforced, thus causing water and land pollution such as in the case of the Tanjero River. Simultaneously, the region's public and private health sectors are suffering from inadequate technical and human expertise to sustainably manage health-generated wastes.[499]

Moreover, there is no precise data about the amount of medical waste in Sulaymaniyah city. According to the Infection Control Department from the Directorate of Health in Sulaymaniyah, about 50 to 60 tons (as mentioned)of medical wastes are collected monthly in the city, including 15 tons from private hospitals.[500] Another source[501] said that Sulaymaniyah city generates 70 tons of medical wastes monthly, of which 20 tons come from private hospitals as their incinerators only has the capacity to treat about 30 tons monthly. Thus, medical waste management requires accurate data about the size and type of each waste.

As discussed earlier, the private hospitals do not have proper medical waste treatment or incinerators; they generate about 20 tons of waste every month and pay 2000 ID for

[499] Page 354-355.
[500] Mahwe, Aryen Tv, March 27, 2021.
[501] Tofeq, Rudaw Tv., March 22 , 2021.

each kilogram of waste to the government to burn the medical wastes using government incinerators. Meanwhile, existing incinerators in the MoH are not adequate to receive all the generated medical wastes, which are about 70 tons.[502] The lack of incinerators is a huge barrier to controlling the medical wastes.[503]

Therefore, the lack of financial and technical support to the Health Directorate of Sulaymaniyah has accelerated the risks of medical waste to humans and the environment.[504] Respondent 13 explained that during COVID-19, medical wastes had increased significantly,[505] causing public and private hospitals to ask the Municipality to provide them with more land to bury their wastes, which will definitely have dire consequences on the soil and underground water.

Respondent 8 (a Parliament member from the Health, Environment and Consumer Rights Committee or HECRC)[506] was asked about the Tanjero River problem. However, he did not have the needed information about the matter. Meanwhile, the Tanjero River continues to be a well-known environmental problem in Iraq.

According to Article 34 of Law No. 8 (2008) for EPI, the Board should issue specific instructions to regulate medical waste management in coordination with the MoH or other relevant institutions. Even with the inadequacy of Law No. 8 (2008) for EPI regarding medical waste control, no national regulation has been specifically

[502] Mahwe, March 27, 2021.
[503] Ibid.
[504] Ibid.
[505] Respondent 13.
[506] Respondent 8, Parliament members from the Health, Environment and Consumer Right Committee, date of interview: February 9, 2021.

developed by the Board or the MoH based on the recommended international guidelines for medical waste management.

MoH, based on Law No. 15 (2007) for the Ministry of Health in Kurdistan Region of Iraq, has the legal responsibility to take preventative actions to protect public health from transmissible diseases in the Kurdistan environment.[507] The law clearly mentions the coordination between the MoH and the EPI Board to protect and improve the environment and prevent pollution.[508] Despite these legal provisions, the MoH still has not effectively enforced them. The MoH is legally responsible for the lack of modern technical equipment and sufficiently trained experts to treat all types of healthcare wastes using appropriate methods. The MoH should, via certain enforcement mechanisms (such as licensing, monitoring, and administrative penalties), prevent medical waste pollution in the Tanjero River. However, the lack of enforcement of such mechanisms and poor coordination worsened the problem.

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4.3 Conclusion

Iraq has a special ministry for water resources, and recently, under the new government cabinet, an independent environmental ministry was established. However, this does not mean that these agencies are legally and fully authorized to manage water resources, as the country is facing unprecedented water pressure as a result of poor water policy, planning and coordination. Apart from that, in the region, river protection is not entirely under the jurisdiction of the Board and the Ministry of Agriculture and Water Resources; it is also under the responsibility of other government institutions.

[507] Para 4 Article 2, the Law No. 15 (2007) for Ministry of Health in Kurdistan Region of Iraq.
[508] Para 5 Article 2, the Law No. 15 (2007).

Therefore, such a model of water resources management, particularly river protection, expedites overlapping responsibilities and poor coordination, leading to the lack of enforcement of river-related laws. Therefore, it is critical to bring back the Ministry of Environment, or provide more legal authority to the Environmental Board (EPIB) and Water Council (WCR)to empower them to manage their tasks effectively, particularly prevention and controlling river pollution.

Moreover, strong coordination between the federal and the region's governments is necessary in facing external water challenges such as climate change and neighboring water projects, and internal challenges such as poor water management in the country. The next chapter will analyze the available legal mechanisms that the responsible governmental institutions may enforce to prevent and control river pollution.

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CHAPTER FIVE

ENFORCEMENT MECHANISMS FOR THE PROTECTION AGAINST RIVER POLLUTION IN KURDISTAN

5.1 Introduction

The enforcement mechanism includes some specific legal tools that can be implemented to protect the environment. These mechanisms are provided by environmental legislations to be enforced by the relevant administrative institution. Different forms of such mechanisms will be discussed in this chapter. They are grouped into two main categories: legal techniques and administrative penalties that enforce river protection. This chapter aims to answer research question three, i.e., whether the existing enforcement mechanisms are sufficient to prevent the pollution of rivers in the region, such as the Tanjero River.

This chapter will hence discuss the existing enforcement mechanisms, namely the legal techniques used to prevent river pollution (such as, prohibition, obligation, licensing, reporting and enticement) and environmental administrative penalties, which include financial penalties (administrative fine, administrative confiscation, and deprivation of financial benefits) and non-financial penalties (warnings, closure of work place, license revocation, removal, prohibition of some equipment and materials, and legal

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prosecution against the responsible employees). The study assesses the adequacy and effectiveness of these enforceable mechanisms towards river protection in the region. To do so, the study highlights the availability of these legal enforcement mechanisms within environmental law and water law in Kurdistan Region of Iraq. Simultaneously, the study discusses the extent to which these mechanisms have been implemented by the EPI Board. Lastly, the study addresses the responsibility of the board and other ministries in enforcing such tools in the case of the Tanjero River (among others) in order to prevent or minimize pollution in the river.

5.2 Legal techniques as a mechanism to prevent river pollution

There are some legal instruments used for protecting the environment. In this section, the study discusses these legal mechanisms to explain the extent of their effectiveness in preserving rivers. The study also examines these enforcement mechanisms by analyzing the existing environmental legislations to determine whether these mechanisms are sufficiently applicable to Kurdistan's environmental legislation particularly in relation to Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq. The five most useable mechanisms within environmental laws to protect the environment, including rivers are Prohibition, Obligation, Permission (license), Warning and Promotion.[509]

5.2.1 Prohibition

The environmental legislation prohibits some activities that damage the environment. The law might ban some human activities due to their dangerous impacts on the

[509] Al-hlo, *Environmental Protection Law in the light of Sharia- In Arabic*, 167.

environment, such as water resources. The law could forbid some activities completely or partially.[510] There are two types of prohibitions, namely:

(a) Complete prohibition

Absolute ban or complete prohibition means that the law prohibits specific activities due to their environmental hazards.[511] Here, the law does not make any exceptions for such activities. Among the examples of this are:[512]

a) Prohibitions of waste disposal in specific areas by the administration body such as the municipality. This prohibition has been included in most countries' laws and regulations.

b) Prohibition of discharges into rivers, seas and regional waters. This is also assertively mentioned in many countries' law, despite the many international conventions in this regard.

   For example, Article 22 states:

   > "*The exertion and discharging of any harmful substances, liquid, gaseous, radioactive or thermal, into water sources or their streams is prohibited if they are not treated according to usual standards.*"[513]

Furthermore, a new water law also prohibits the discharge of wastes into water resources under Article 9.[514] Internationally, there are some provisions that directly or indirectly protect natural resources. For instance, Principles 2 and 7 under the United

[510] Ibid, 167.
[511] Ibid.
[512] Ibid.
[513] Article 22, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.
[514] Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.

Nations Conference on Human Environment (UNCHE) 1972 highlighted the duty of states to preserve natural resources and prevent pollution. Principle 2 states:

> *"The natural resources of the earth, including the air, water, land, flora and fauna and especially representative samples of natural ecosystems, must be safeguarded for the benefit of present and future generations through careful planning or management, as appropriate."*[515]

c) Usage of some special pesticides such as insecticides known as DDT. The prohibition of this type of pesticide started in developed countries, and other countries initiated to adopt it because of the dangers of this chemical on the environment.

To illustrate, Article 39 of Law No. 8 (2008) for EPI in this regard states:

> "*Manufacturing, importing, spraying, exchanging and using of epidemic pesticides or any other chemical compounds for the purpose of agriculture or health or public health, or other purposes are prohibited, except after keeping the conditions, controls, and the insurances determined by the regulations and the instructions issued according to this law, which ensure that all environmental components will never be exposed directly or indirectly now or in the future to the harmful effects of pesticides and chemical compounds."*

Likewise, the new water Law No. 4 of 2022 for Water Management and Protection in Kurdistan Region of Iraq also prohibits the usage of any pesticides or chemical

[515] UNCHE, 1972.

compounds for preventing agricultural diseases as they cause pollution to rivers or other water resources, which is states under Article 9 that:

"Following activities are prohibited:

> *Para Six: Using of pesticides for eliminating agricultural epidemics or chemical compounds that cause pollution to water resources."*[516]

Despite such provisions within the region's environmental law and new water law, such substance is still not properly managed by farmers in agricultural activities and hence causes water pollution. The Ministry of Agriculture and Water Resources plays a poor role in preventing the negative impacts of these chemicals on the environment, particularly in the case of the Tanjero River, which will be discussed later.[517]

d) Prohibition of some chemical materials in the food industry for preserving color, smell, etc.
e) Prohibition of some other materials such as dangerous foreign wastes, and the import of nuclear and chemical wastes from a foreign country into another country. The law forbids this action due to its devastating impacts on the environment.

Paragraph 1, Article 35 of Law No. 8 (2008) for EPI prohibits importing dangerous wastes to the region. The import of dangerous materials or wastes and substances across the region is also prohibited unless with permission by the Ministry or the Board:

[516] Para 6, Article 9, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[517] Respondent 2.

"The following are prohibited:

> *First: Importing of dangerous wastes that result in damage for humanity and environment in the region.*
> *Second: Importing dangerous substances to the region without the Ministry's consent.*
> *Third: Passing dangerous wastes and substances through the region without the Ministry's consent."*

Simultaneously, Article 36 also emphasizes the prohibition of production, importing and transportation of such dangerous wastes and substances until the fulfilment of the environmental requirements according to the laws and regulations. In addition, the new water law also includes some provisions that completely prohibit activities that cause water resource pollution:

> *"The changing of water direction, which impacts water quantity or causes water pollution or floods."*[518]

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This provision is also violated in the case of the Tanjero and Serwan rivers. This issue was highlighted by some of the study respondents to be caused by human activities, particularly quarry activities by the rivers, which caused various damages including the changing of the river direction, damaging of the water quality and quantity, destruction of the surrounding green area, and depletion of biodiversity.[519]

Furthermore, another activity prohibited by the new water law is the landfilling of wastes if they cause water resources pollution. Paragraph 5, Article 9 states:

[518] Para 2, Article 9, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[519] Respondents 3, 9 and 10.

> *"Landfilling of wastes in any way that causes impacts on the quality and capacity of surface or underground water resources or environment."*[520]

This is a positive provision since water resources, including the Tanjero River are facing pollution due to the landfilling of various wastes including medical wastes as discussed earlier in the study and highlighted by the study respondents.[521]

Article *9 also prohibits certain activities that pose a threat to water resources:*

> *"Eight: Discharge of poison materials, electric power, TNT, or weapon or other deadly tools or materials for fishing or other aquatic animals, in a way that causes water resources pollution."*[522]
>
> *"Nine: Discharge of oil wastes into surface and ground water resources."*[523]
>
> *"Ten: Disposal of poultry and animal wastes into water direction or basin."*[524]

The data gathered from the interviews shows that the Tanjero River area is experiencing a noticeable amount of animal and poultry wastes.[525] This is, therefore, a positive provision that requires effective enforcement.

> *"Eleven: Any activities that cause water pollution or nearby the natural basin of water direction, or cause negative impacts on the quantity and quality of water."*[526]

[520] Para 5, Article 9, Law No. 4 (2022).
[521] Respondents 2, 9, 10, 11, 12, and 13.
[522] Para 8, Article 9.
[523] Para 9, Article 9.
[524] Para 10, Article 9.
[525] Respondents such 9, 10, 11, 14 and 15.
[526] Para 11, Article 9.

This new water law is a positive move towards prohibiting the discharge, disposal or use of any wastes that pollute water resources,[527] since the Tanjero River is already polluted by various wastes, particularly oil, poisons, heavy metals, and poultry and animal wastes. Thus, responsible agencies should strictly apply the new law to prevent regional river catastrophes.

It is crucial to prohibit all activities that have a negative impact on rivers. Respondent 9 mentioned the necessity to prohibit some human activities nearby rivers due to their impact on the rivers' water quality:

> *"There are some activities that should not be allowed to be carried out nearby rivers. For example, washing cars in rivers should be banned because it causes river pollution. However, there are some people who dump their construction wastes in rivers. This is the outcome of the absence of law enforcement. As we have specific policies and an Environmental Board to protect forests, they should prevent such negative habits."*[528]

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Article 9 is crucial in the new water Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq, particularly the last provision, which provides sufficient safeguarding of water resources by stating the term "any activities" that cause water pollution. For instance, in the case of the Tanjero River, certain human activities cause river pollution such as washing cars on the river, and the discharge of various wastes into the river by private sectors or individuals.

[527] Article 9, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[528] Respondent 9.

Moreover, the new water law authorizes the Minister of Agriculture and Water Resources to prohibit drilling wells or usage of water wells in some areas based on the reports of the water council. If there is concern about the reduction of water quantity and quality, the owner of the well is required to pay a compensation based on this law and other regional laws.[529] This concern is appreciated by the legislature in relation to underground water protection since climate change and manmade impacts have caused underground water reduction in the region. For example, in Hawler city, the water level in existing wells has significantly decreased in some areas. As such, the governorate of Hawler and other water-related institutions decided to drill 138 new wells to provide water for the people using underground water. Another water project, namely "Ifraz 4" uses surface water, as mentioned earlier.[530]. Strong law enforcement and monitoring are necessary in curbing illegal well drilling.

(b) Partial prohibition

Partial prohibition of certain parts of specific activities which might damage the environment may also be imposed. Laws and regulations may allow these activities based on the conditional requirements and licenses attained from special government agencies. These activities might include:

a) The establishment of some industrial projects that has environmental impacts such as chemical industries, mining industries and industries related to nuclear radiation.

[529] Article 17, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region-Iraq.
[530] STOP Organization for Monitoring and Development(NGO), and MULK NEWS Media, *Analytical and assessment report: Threats of declining underground water level in Hawler; Residential projects as example*, 6.

Article 30, Law No. 8 (2008) for EPI in this regard mentions the coordination between the Ministry of Environment and other relevant institutions in setting environmental requirements for some industrial activities, including oil, mining, and quarry:

> *"The Ministry in coordination with the related agencies, puts suitable environmental conditions for the activities of exploration, mining, quarries, smasher, washers, mines, extraction of petroleum resources and others in a form that protects the natural resources in the region from pollution and depletion."*[531]

In Kurdistan, such industries still do not comply with the environmental requirements although quarry factories have tremendously affected the Tanjero and Serwan rivers (as discussed in the previous chapter). Although legislations such as Law No. 91 (1988) for Regulating Mining Investment prohibits practices that cause damage to the rivers, some industries still do not comply with the law. The continuous river degradation, droughts and water projects have severely damaged the quality and quantity of the Serwan River. Although the local government had decided to prohibit some activities that damage the river basin by quarry factories, beginning from 1 January 2022[532] to minimize river damage caused by quarry activities, river degradation continues. Thus, it is crucial for river restoration efforts to ban all existing quarry activities nearby the rivers completely. Robust enforcement of existing legislations could minimize the risks for the rivers.

b) Opening of businesses such as shops, which pose dangerous effects or activities that bring harm to human health or cause anxiousness to people.

[531] Article 8, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.
[532] Garmian Administration, Decision Number 1902 on 14 June 20, 2021.

c) Discharge of wastewater into water resources such as rivers. This also requires permission based on specific standards to prevent river pollution or to reduce the negative impacts of wastewater on rivers. Article 22 in Law No. 8 (2008) for EPI of Kurdistan states:

> *"The exertion and discharging of any harmful substances, liquid, gaseous, radioactive or thermal, into water sources or their streams is prohibited if they are not treated according to usual standards."*[533]

This Article is somehow too general, not clearly stating the "usual standards". Many industries and human activities in Kurdistan discharge wastes into rivers, particularly the Tanjero River. Therefore, the prohibition of illegal as well as legal activities that do not fully comply with the environmental requirements is a critical mechanism if enforced precisely and rigorously.

Law No. 4 (2022) for Water Management and Protection in Kurdistan Region-Iraq is almost the same as the provision in Article 9, which states:

> *"Waste disposal form residential areas, industrial projects, agricultural and business, weapon wastes, heath wastes or wastes from other sectors into water resources, except if treated scientifically."*[534]

Here, the provision is also too general. It requires a clear and comprehensive instruction by the MoAWR with rigorous enforcement since the region does not have waste treatment infrastructures for all types of wastes, thus causing river pollution.

[533] Article 22, Law No. 8 (2008).
[534] Para 1, Article 9, Law No. 4 (2022).

d) Transportations of ships that hold hazardous wastes through regional water of the country. This also requires acceptance or special permission from the country with sovereignty over this water part.

Besides that, the new water law also highlights activities that are not allowed unless permission has been given by the MOAWR, such as the drilling of water wells or, the usage of underground water, water storage projects, or the reduction of water resources.[535] The new water law is also related to river protection against the impacts of projects, as stated in Article 9:

> *"Following activities are prohibited; Seven: The establishment of some projects, factories and residential areas on the river basin, lake, water storage projects and specific boundaries area unless a license is provided by the ministry (MoAWR), except for water resources projects whereby license is not required."*[536]

It is better to completely prohibit such activities on the river basin due to their impacts on the river quality, and since the region and Iraq are currently facing drought and severe water shortage. Additionally, it is better to omit the word 'residential area' altogether. As mentioned earlier, the municipality of Kalar city had announced a new plan to develop several socio-economic projects near the Serwan river, including two new residential areas.[537] Residential projects shift the river basin from being public property into private property. Apart from that, residential areas or housing systems do not utilize water in a sustainable manner. Thus, such projects bring dire impacts on river quality and quantity.

[535] Para 3 and 4, Article 9, Law No. 4 (2022).
[536] Para 7, Article 9, Law No. 4 (2022).
[537] GK Report, 2022, accessed on September 10, 2022, https://www.gksat.tv/video.aspx

Based on that, legislature needs to carefully list all the activities that negatively impact the environment, particularly river water, to prohibit them from being conducted near rivers, unless they have fulfilled the set pre-requirements and standards. More importantly, there is a need to rigorously implement all environmental requirements of the projects. In the current situation, the study notes the lack of law enforcement in this regard.

5.2.2 Obligation

Obligation is the necessity to do specific actions, and is used by the administration authority to mandatorily obligate private sectors or people to conduct certain activities to protect the environment.[538] In some cases, the legislation obligates people to conduct certain positive actions to protect the environment. Examples of such legal obligations and their enforcement mechanisms are highlighted below.[539]

a) Obligate the person who caused the environmental pollution to remove the pollutant consequences and take financial responsibility to pay for the harm caused to others or states. In this regard, Article 21 of Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region under the title "legal responsibility for compensation on environmental damage" states:

> *"First: Anyone who causes environmental impairment, by his own action, negligence, or by the action of whom are under his care, observation, or control from persons or followers, or by dissenting the laws or regulations and instructions is responsible, and he is obliged to compensate, remove the impairment and return the state as it was before, during a period of time limited by the Ministry and according to conditions put by it. In the case of neglecting or non-*

[538] Turkya, 132.
[539] Ibid.

submission, the Ministry after notifying him, can take over the procedures and action to remove the impairment and the causer bears all the losses for this purpose, in addition to the administrative costs with respect to the following standards:
1. Dangerous degree for types of polluted substances.
2. The effect of pollution on the environment now and in the future."

Based on that, the polluter has a legal mandate to pay compensation for the damage, remove the pollution, and return to the state as before. Even though this provision is significant in obligating the polluter to compensate for the environmental damage and remove its consequences, the study believes that the enforcement of this provision is difficult since it requires the technical and scientific capacity to evaluate the environmental damage based on the standards as well as the current and future effects of the pollution on the ecosystem.

b) Obligate the owners of industrial and business projects to eliminate their harmful wastes in environmentally-friendly ways to reduce the environmental damages. The law and regulations should also obligate industrial owners to treat, store and manage the wastes based on specific standards and measures. Industries should also be obligated to reuse and recycle their wastes, if possible, in a scientific manner. The law requires the submission of an EIA report to the board, which should include proper mechanisms for managing waste in an environmentally-sound manner. For instance, EIA is obligated to do any activities that have environmental impacts. As Article 12 of Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region states:

"Any person normal or moral, general, specific, mixed, or any agency, after execution of this law, that performs an activity which

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affects the environment, must prepare a study to assess the environmental impact of the activities and projects that will be constructed, then send it to the Ministry in order for it to make a convenient decision about the matter. The study must include the following:

First: Evaluation of the positive and negative effects of the project, establishment or factory on the environment.

Second: Suggested means to prevent and treat the causes of pollution, which attains engagement to the environmental instructions and controls.

Third: The probable and emergency pollution states and the reservations that must be carried out.

Fourth: Possible substitutes for using more clean environmental techniques.

Fifth: Minimizing, recycling and reusing the wastes.

Sixth: Assessing the cost of environmental interest and impairment produced by the projects."

Although the EIA report should include data about the positive and negative environmental impacts of the project along with the appropriate methods to prevent and minimize such impacts or pollution, there is a weakness in this regard for the region as most of the industries discharge their wastes into the rivers in non-environmentally sound manner or without any pre-treatment. Therefore, effective enforcement of environmental standards is highly necessary.

In addition, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq obligates projects with wastes to have their own treatment plants; otherwise, they are not allowed to operate.[540] The law further states:

[540] Para 4, Article 11, Law No. 4 (2022).

> "*Any project that has wastes, till the enforcement of instructions of relevant ministries, are not allowed to be established."*[541]

Although this is a positive provision, it is not mentioned to the enforcement of the instructions of the Environmental Protection and Improvement Board, as stated ".. till the enforcement of instructions of relevant ministries.." .

This is because the EPI Board is not a ministry and has environmental requirements, including the EIA, for almost all projects with waste. In terms of existing projects that discharge their generated wastes into water resources, the new law states:

> *"Those projects that legally exist and discharge their wastes into water resources, a period of six months is given from the date of implementation of this law to build their waste treatment plant; otherwise, their license will be taken away."*[542]

Although the provision obligates these projects to have a treatment plant, it would be better to clearly state the word "must" to emphasize obligation as follows:

> *"Those projects that legally exist and discharge their wastes into water resources must build their waste treatment plant within six months from the date of implementation of this law; otherwise, their license will be taken away."*

Besides that, this provision does not clearly state whether the license revocation for errant projects would be permanent or temporary.

c) To protect air from pollution, the law and regulations might obligate car drivers or trucks to be resolute or handle their engines to reduce fume disposal into the air.

[541] Para 3, Article 11.
[542] Para 5, Article 11, Law No. 4 (2022).

d) Last but not least, the law and regulations may obligate public or private educational institutions to include environmental awareness in their curriculum, as stated in Paragraph 3, Article 3 of Law No. 8 (2008) for EPI:

> *"General and special educational and academic institutions in the region must insert environmental education programs in their curriculums in coordination with the Ministry."*[543]

Furthermore, Paragraph 4, Article 3 obligates NGOs as well as public and private institutions in research, learning, education, media, and regional to share environmental awareness in the region. Despite such obligations, such institutions still have not established the necessary environmental awareness programs due to the lack of enforcement and poor coordination between the Board and other institutions such as the Ministry of Education and Ministry of Higher Education and Scientific Research.

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However, the new water Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq does not clearly create an obligation for educational institutions to raise awareness about water protection through their study programs; instead, it only mentions the duty of the MoAWR in coordinating with other ministries, NGOs and media in this regard:

> *"The Ministry (MoAWR) must do the following things; Fourth: Coordinate with other ministries, non-governmental organizations and media to raise awareness about the importance of water for living and pay attention to that in the educational system."*[544]

[543] Para 3, Article 3, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.
[544] Para 4, Article 6.

In addition, Paragraph 5, Article 3 of Law No. 8 (2008) obligates governmental institutions to consider natural resource protection to accomplish sustainable development. It states:

> *"All administrative agencies, each in their way, must ration the utilization of natural resources to achieve sustainable development."*[545]

However, this provision does not clearly delineate these "administrative agencies". It is too general, which makes its enforcement difficult. Lastly, Paragraph 6 of the same Article obligates health institutions and quality control to consider environmental principles in their field. It states:

> *"Healthcare institutions, measurement devices and quality control must consider the environmental health principles in their working programs."*[546]

This is a critical provision due to the strong relationship between pollution and health situation or quality control. Nevertheless, in reality, this provision is still not implemented properly. For instance, based on a new study, some oil projects do not comply with the scientific standards for gasoline production and poor quality gasoline poses health risks such as cancer, among others.[547]

Hence, the environmental legislation should obligate individuals, relevant projects or industries to take specific measures to prevent or minimize pollution. For instance, in the case of river pollution, the environmental and water law should have clear

[545] Para 5, Article 3, Law No. 8 (2008).
[546] Para 3, Article 3, Law No. 8 (2008).
[547] *Legal Ranj Program*, "Waste management in Kurdistan region," Rudaw TV., accessed April 20, 2021, https://www.rudaw.net/english.

provisions that obligate the prevention of river pollution or the establishment of treatment plants before conducting waste discharges into rivers.

5.2.3 License (permission)

Every activity and industry with environmental impact must get a license before starting their business in order to prevent or minimize environmental pollution. License is the permission issued by a special administration agency based on some legal requirements that allow the practice of certain activities that otherwise cannot be performed.[548] To obtain a license, certain fees must be paid to the administration authority along with other requirements. [549]

The license could be permanent or only for a period of time. A license may be issued by a central authority to obtain permission for nuclear projects, or issued by states such as in a federal country. A municipal authority could also issue a license such as obtaining permission to collect wastes or establishing certain projects. Activities performed without a license would be imposed with different legal punishments such as criminal, administrative and civil sanctions.[550]

Permission is required to protect human life in the case of weapon handling, and to protect public health in the case of food-related projects. In addition, licensing is required to preserve the environment in the case of wildlife hunting or fishing, agricultural activities, industrial activities, or any other activities with environmental

[548] Majid Raghib Al-hlo, 170.
[549] Turkya, 118.
[550] Al-hlo, 170.

impacts.[551]Licensing is considered a preventative mechanism to protect the public system, specifically its three main elements: public health, public security, and public quietness. [552]

As a result of social and economic developments, the public system has been extended to include more aspects, including the environment. Therefore, nowadays, the concept of the public system and public interest has changed. Thus, licensing could assist the government in monitoring projects before and after their establishment to ensure that they follow all the environmental requirements.[553] Likewise, licensing is needed in the exploitation and investment of natural resources to protect the financial and economic interests of the country, based on the wide concept of public benefit or public interest.[554]

Additionally, licensing is considered an exception to the right of freedom. It should be imposed by the law based on strong legal justifications. This is because it restricts the constitutional rights of human beings, such as the right to work and others.[555] For example, licensing is recognized as an administrative decision based on the rules of the Egyptian and French administrative courts. The High Administrative Court in Egypt states: "There is no objection that license is an administrative decision..." [556]

[551] Ibid.
[552] Mohammed Jamal Othman Jbril, "Administrative License" (Ph.D. these submitted to college of law, Ain Shams University, Cairo, 1992), 110.
[553] Ibid, 110.
[554] Aiman Mohammed Sliman Maree, *Legal System for Nuclear License and Radiation* (Cairo: Dar Alnahda Al Arabia, 2003), 41.
[555]Mohammad Tayb Abdul Latif, "Licenses and notification system in Egyptian law: comparative study" (Ph.D. theses submitted to college of law, Cairo University, 1956), 74; Mentioned by: Hsam addin Mohammad Mrsy Marey, "Estimated authority in the field of administrative control in regular circumstances" (PhD theses, college of law, Alexandria University, 2009), 400.
[556] Decision of High Administrative Court on February 26 1972, collection, Year 17, 263.

Therefore, based on the discussion above, licensing is a useful mechanism for protecting the environment, allowing administration agencies to supervise projects with a legal license. However, there are still many projects that are operating without a legal license in the region. For instance, nearby the Tanjero River, some oil projects and industrial activities are operating without a legal license, causing river pollution (as mentioned earlier in the study).

Respondent 4 believes that the enforcement of environmental legislation is the main solution to the river pollution issue in the region. According to him, some industries, especially oil projects, do not have a legal license to operate. Environmental teams, hence, face difficulties in monitoring such illegal projects. The respondent states:

> *"The problem is enforcement of the law. Most oil projects such as oil refiners and factories, do not have a legal license. Projects without a license cannot be monitored or imposed with legal penalties. This is because all the provisions under Law No. 8 (2008) for EPI only refer to projects with a license, based on certain environmental requirements such as having green spaces and specific distance from the water resources or residential areas, among others."*[557]

Based on the Board's 2020 annual report, the Board granted a total of 1329 licenses, permission, and acceptance to different projects and investments, out of which 251 projects are located in Sulaymaniyah. These include industrial, food industry, services, business, agriculture, health, and deep well projects. Only 19 projects were not approved by the Board due to their non-compliance with environmental standards,

[557] Respondent 4.

laws and regulations.[558] Meanwhile, the 2021 Board report indicates that the number of projects in the region granted legal licenses had doubled to 2876, including 981 projects in Sulaymaniyah. A total of 48 projects were denied a license due to non-compliance with environmental laws and regulations. [559]

The water Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq also adopts licensing as a legal tool for protecting water resources. For example, Article 9 prohibits activities that affect water resources. As mentioned earlier, some of these activities are totally prohibited, while others require a license by the MoAWR. Article 9 states:

> *"These activities are not allowed,*
> *Three: Drilling wells or underground water utilization without permission by the ministry.*[560]
> *Four: Any activities for storing or reducing water resources without previous permission.*[561]
> *Seven: Establishment of any project, factory, house in river basin or river branches, lakes, water storage, specific surrounding land without permission by the ministry, except for water and sewerage projects."*[562]

Meanwhile, respondent 3[563] mentions how licensing can sometimes cause overlapping responsibilities. The respondent[564] states:

> *"Actually, we have many routines in giving license or permission to projects. For instance, to obtain permission or license, acceptance*

[558] Environmental Protection and Improvement Board, Annual Report of 2020.
[559] Environmental Protection and Improvement Board. Annual Report of 2021.
[560] Para 3, Article 9.
[561] Para 4, Article 9.
[562] Para 7, Article 9.
[563] Respondent 3.
[564] Respondent 3.

is needed from different general directorates from different ministries. However, these institutions do not comprehensively assess the project in terms of the EIA."

He further explains:

"The weaknesses of these directorates in their tasks, particularly regarding the enforcement of environmental requirements, is due to the fact that their directors have been nominated for their position mostly on political relationship instead of their professional experiences and skills."

Based on that, political interfaces are another obstacle for law enforcement in preventing environmental pollution, including in the case of the Tanjero River. The new water law gives the main responsibility to the MoAWR to manage water resources and give out licensing; yet, this law also follows the existing routing and asks for their approval and coordination with other ministries to give out licenses. Article 16 states:

"Firstly: 1. All projects that use water resources, according to enforced law in the region, after acceptance from other relevant institutions, will gain license by the ministry. 2. All investment projects, according to enforced law in the region, after acceptance from other relevant institutions, will gain license by the ministry."

Therefore, these routing will take time and may cause overlapping of responsibilities. However, investment projects should obtain a license from the ministry before beginning operations, since currently almost all investment projects, particularly those in residential areas, use underground water by drilling wells, which in turn causes the decrease of underground water level. For instance, as mentioned earlier, Hawler city is now facing a water crisis whereby the depths of wells are now between 400-600

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meters; 10 years ago, the level of underground water decreased by 50 to 60 cm annually, while currently it is 5 to 6 meters annually.[565] Furthermore, based on the report, these investment projects do not get a license for water utilization before they begin operations; therefore, most of these projects do not take into account the master plan of the city, water services and the situation of the underground water.

Additionally, the report[566] and speakers of the EPI Board announced in June 2022 that most of the existing residential projects do not follow the requirements to protect the environment and water resources by providing 25% green area and establishing a wastewater treatment plant.[567]

Paragraph 2, Article 16 of the new water law[568] mentioned that all existing projects in the agricultural, industry, business and tourism sectors which use surface and underground water resources without any permission should ask for permission from the ministry within 6 months from the date of implementation of this law; otherwise, they are considered to have violated this law. Although the study believes this is a positive provision, it would be better not to name only these four sectors.

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[565] STOP Organization for Monitoring and Development (NGO) and MULK NEWS Media, *Analytical and assessment report: Threats of declining underground water level in Hawler; Residential projects as example*, 17.
[566] Ibid.
[567] Khilany, Abdul Razzaq, Gali Kurdistan, 15 June 2022, https://www.gksat.tv/video.aspx .
[568] Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.

Based on the discussion above, the weaknesses in law enforcement concerning licensing are due to various factors such as political power, administrative routing, and poor coordination among the institutions granting permissions or licenses. Article 15 of Law No. 8 (2008) for EPI emphasizes the proper coordination between the Board and other governmental institutions in ensuring the existence of proper environmental protection mechanisms before issuing licenses to projects or those that fall under their monitoring (Figure 5.1).

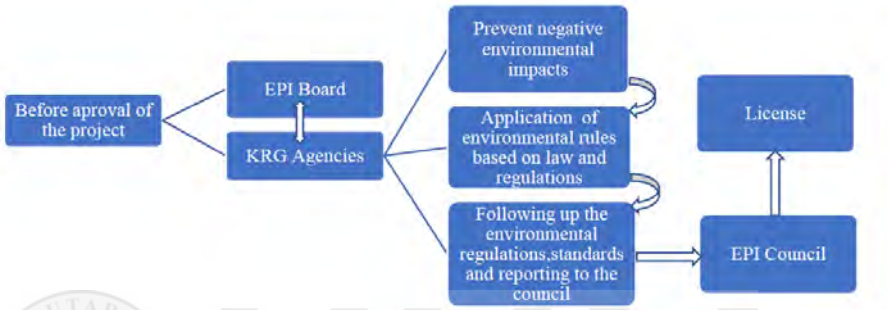

Figure 5. 1 Procedures before giving license by KRG according to Article 15 of Law No. 8(2008) EPI

Article 15 states:

> *"All the related agencies, in coordination with the Ministry (EPI Board) before receiving approval for any project, commit to take over the following steps and procedures:*
>
> *First: Work to prevent negative environmental effects resulting from their projects, projects submitted under their supervision, or projects consent about it.*
>
> *Second: Taking over all the suitable procedures to ensure the application of rules forenamed in this law on their projects or the projects submitted under their supervision, or which proposed to issue the consent with the regulations and instructions issued according to this law.*
>
> *Third: Observing and following up the environmental regulations and standards, keeping them in their projects or projects submitted to their supervision, and providing the council with periodic reports.*
>
> *Fourth: Coordinate with the council (Environmental Protection and Improvement Council in the Region) before issuing any consent or*

permits related to performing strategic or giant activities affecting the environment."

Based on the above provisions, other ministries are legally responsible for preventing river pollution through proper coordination and effective enforcement with the board and other relevant institutions.

5.2.4 Reporting

This is a new mechanism developed by the legislatures based on the international improvement of environmental protection efforts, which comes from new legal provisions in this regard.[569] Environmental laws and regulations sometimes allow people to practice certain activities without prior permission or license. Although an activity might lead to pollution, a license is still not required. The only requirement is a report before the commencement of the project or within a specific time period after its commencement. This is because the project has a lower possibility of environmental pollution or the action has a lower level of dangerousness.[570] This is, hence, a complementary way to obtain a license that allows the monitoring of projects through reports to the administration to combat any potential environmental impacts, which is easier in terms of financial costs and staff monitoring.[571] Reporting can be categorized into two namely:

i. Pre-project reporting

In some cases, there is a legal requirement for reporting before starting a project. This means that a report should be submitted about the project or activity before starting it.

[569] Turkya, 134.
[570] Al- hlo, 172.
[571] Turkya, 134.

Previous reporting assists the administration in looking at the business or project under-reporting to ensure whether it has any environmental consequences. The administration will not allow the activity to commence if negative environmental impacts are found; otherwise, the administration would allow it to proceed.[572]

Pre-project reporting is similar to licensing, especially when the administration does not respond after the submission of the report, which could be considered as an implicit acceptance of the project under-reporting. Meanwhile, if the administration expresses affirmative actions to reject the project, it explicitly indicates its rejection to give permission.[573] There are many examples that require previous reporting before starting a project, such as in the case of exporting and importing wastes to other countries, as stated in the Finland Environment Law of 1979, which gives authority to the Ministry on Environment to give out permission to operate. This type of reporting is crucial if it depends on clear requirements and obligates projects to prepare it before the commencement of any activity. Thus, reporting may be useful for the government to assist them in monitoring the projects to ensure the protection of the environment, including rivers.

ii. Subsequent reporting

In some cases, the laws and regulations allow the initiation of a project without prior reporting, but require a report within a certain period of time after starting. The administration authority has a specific time to monitor projects to ensure that their activities do not have negative impacts on the environment. Thus, based on the report, the government can either approve or reject the project based on its environmental

[572] Al-hlo, 172.
[573] Ibid.

effects. Subsequent reporting is more suitable for public freedom compared to previous reporting, whereby a project cannot start without first getting permission or acceptance. There are many examples that legally require subsequent reporting, such as in the case of industry or business projects that do not harm public health or public relaxation or quietness, and agricultural activities that may cause environmental impacts due to the usage of pesticides or other chemical materials.[574] Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq adopts reporting as a self-monitoring mechanism. Article 17 states:

> *"The owner of any project or establishment must encompass the processes of self-monitoring in coordination with related agencies according to the measurements, and controls put by the Ministry (Board), and send the reports about it according to the Ministry's instructions or any other agencies determined by the regulations and instructions that issued according to this law."*

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Based on this Article, every project needs to submit a report based on coordination between the Ministry of Environment, which the EPI Board currently replaced according to Law No. 3 (2010) for the EPI Board[575] and related institutions. However, this provision does not clearly state the agency to whom the report should be submitted. It is regulated based on the instruction which will be issued by the Board and other relevant institutions. It also does not state which type of report is required, i.e., whether previous or subsequent reporting. Therefore, it is better to clearly state if this report should be submitted before or after the establishment of the project based on its impacts and classification. This report should be submitted to the Board, which

[574] Al-hlo, 173.
[575] Article 11.

plays the main role in monitoring projects to ensure their compliance with the environmental requirements. Article 16[576] clearly states:

> *"The Ministry (Board) observes the institutions, projects, establishments and different activities to determine the extent to which they are committed to the specifications, standards and measurements, which depend on the protection of the environment according to the rules of this law."*

Therefore, the EPI Board oversees the environmental situation in the region. Article 17 may be amended to state that the self-monitoring report is to be submitted to the Board, and to remove the ambiguousness regarding the time of submission. As highlighted by respondent 5, the limited human resources in the Directorates of Environmental Protection and Improvement Administrations, under the EPI Board, is due to insufficient staff and experts for monitoring projects.[577] Therefore, reporting is a significant mechanism if enforced properly to monitor projects that may have impacts on the environment, including rivers.

Although Law No. 4 (2022) for Water Management and Protection of Kurdistan Region in Iraq gives the main role of managing water resources and monitoring its utilization and impacts to the Ministry of Agriculture and Water Resources, it does not clearly adopt reporting as a mechanism for monitoring water utilization and assessing their impacts; instead, other means such as licenses are used. However, reporting may be adopted through instructions that will be issued by the Minister of Agriculture and Water Resources in the region based on Article 21 of the law.

[576] Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.
[577] Respondent 5.

5.2.5 Enticement

The meaning of legal enticement is to provide financial or non-financial offers to encourage people to prevent pollution or reduce it. These include financial assistance, credit, tax exemption or legal facilitates, economic insurance, etc. The purpose of such technique is pollution reduction. Examples include waste recycling and the usage of alternative materials with lower environmental impacts, such as organic materials that can decompose easily. Other than that is the usage of new technology that relies on clean, safe, and renewable energy.[578] Therefore, environmental laws should use these mechanisms to encourage the private sector and other business projects to protect the environment by shifting to green industry. Article 20[579] of Law No. 8 (2008) for EPI states:

> *"The Ministry (Board) in coordination with the Ministry of Finance prepares a system of incentives to aid moral or normal persons who encompass activities or offer things to protect or improve the environment."*

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Although Article 20 is a good step, it is too general. Kurdistan's legislature takes a positive step in using such mechanisms to motivate people and industries to contribute to environmental preservation. However, this provision does not explicitly define this incentive system as it does not state the types of assistance or motivation provided. This provision needs to be revised to explicitly include all types of aid whether financial or non-financial. Besides that, after 14 years of the issuance of the law, this provision is still not enforced, while the Board and Ministry of Finance have not issued any system or instruction for a clear mechanism to put it into practice. Respondent 4,

[578] Al-hlo, 174.
[579] Law No. 8 (2008).

a senior legal expert from the Board, criticized the environmental motivation in Kurdistan:

> *"The encouragement is not sufficient in Kurdistan. For instance, some places and projects have developed in terms of environmental protection by adopting environmentally-friendly ways. However, we as the Board do not provide them financial assistance or appreciate them."*[580]

In addition, respondent 3[581] was asked about the existence of any motivational mechanism for the private sector to encourage them to adopt environmentally-friendly mechanisms and technologies. He stated:

> *"I have not seen or heard anything about such a motivation system. If this exists, it is beneficial and renders a competitive environment between the private sectors to develop their function along with environmental protection".*[582]

The current practice of such encouragement to support industries and projects to develop their infrastructure in an environmentally-sound manner is still poorly regulated and enforced in the region. This is attributed to inadequate legal provisions within Law No. 8 (2008) for EPI, the absence of specific instructions by the Board and Ministry of Finance and Economy, as mentioned in Article 20, and the lack of enforcement in this regard.

Based on the 2021 annual report, the Board received 332,666,000 million Iraqi dinars (ID) in 2021. Thus, it is advisable to allocate some of the Board's revenue to encourage

[580] Respondent 4.
[581] Respondent 3.
[582] Respondent 3.

industries towards sustainable development by adopting environmentally-friendly technologies to protect the environment, particularly rivers.

The new water Law No. 4 (2022) does not provide any financial or non-financial encouragement to the industries and projects to establish water treatment plants or other environmentally-friendly technologies, which may cause procrastination and poor enforcement of the legal requirements of the new water law. The new law created the Box for Water Resources Protection and Improvement in the Region to support water resource preservation and its enhancement.[583]

Paragraph 2, Article 14 states that the box's revenue will be used for the purpose of water resources protection and development, and water pollution prevention. Based on the law, the Council of Ministries should issue a system to clarify how to spend the income of the box.[584] Therefore, it is advisable to add a provision to clearly mention the provision of such financial and non-financial enticement to support water protection and development, since this law encourages industries and other projects to establish water treatment plants. For instance, it may give some borrowers tax exemption to encourage industries to bring in new water-friendly technology. Besides that, it may still financially assist them based on the existing provisions mentioned above.

Developing and implementing such mechanisms is critical to protect rivers from wastes discharged by many sectors. This is because such financial and non-financial

[583] Para 1, Article 13, Law No. 4 (2022).
[584] Para 3, Article 14.

encouragement are effective mechanisms for minimizing the existing risks on the rivers by such projects.

5.3 Environmental Administrative Penalties

Law and legislations as a non-scientific mechanism aim to tackle or control environmental problems or pollution by imposing penalties. The function of the law as a control mechanism can be applied through sanctions and penalties imposed upon offenders with the objectives of causing "deterrence, retribution, prevention and reformation" in order to form and regulate the behavior of the entire society. [585]

Penalty in domestic laws has three forms: criminal, civil and administrative penalty. These types of legal sanctions might be combined within the same violation committed against environmental legislations. To illustrate, the owner of the project that causes pollution may be sentenced to imprisonment or fine as a criminal penalty, and may be simultaneously punished by being ordered to remove the traces of pollution and compensate for the consequential damages as a civil penalty. Revocation of a license might be imposed as an administrative penalty. An administrative penalty is a sanction imposed by the administrative authority on every natural and moral person who commits acts that damage the environment in violation of the environmental legislations.[586]

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[585] Harlida Abdul Wahab, Nurli Yaacob, and Haslinda Mohd Anuar. "Punishment for Polluting Inland Water: Case of Corporations," In *The European Proceedings of Social & Behavioural Sciences EpSBS*, 416–424. UK: Future Academy, 2018. https://dx.doi.org/10.15405/epsbs.2018.12.03.41.
[586] Rashid, The Role of Administrative Authority in Protecting Environment from the Harms of Oil Projects, 18.

As has been clarified the meaning, concept and definition of the term 'administrative penalty' to describe those penalties that imposed by the responsible administrative authority on anyone without relying on prior relationships such as contracts. Therefore, the type and gravity of the administrative penalties are different based on the level or seriousness of the environmental offences.[587] As discussed below, public administrative penalties are categorized into two main groups: financial administrative sanctions and non-financial administrative sanctions.

5.3.1 Financial Administrative Penalties

Financial administrative penalties include sanctions imposed on the polluter financially, not on the polluter's body or freedom or social status. There are different types of financial administrative penalties. Three of the most popular environmental legislations are:

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5.3.1.1 Administrative fine

An administrative fine is the amount of money imposed on a person who violates environmental legislation by the authorized administration body.[588] The administrative fine is more suitable due to its impacts on the offender, and because it facilitates the work of the judiciary authorities as well as is easy to impose on corporate personalities such as industries.[589] This sanction might come in other forms, such as reconciliation between the administration and offender, or permanent fees for each offence such as

[587] Turkya, 149.
[588] Al- hlo, 188.
[589] Ibid.

traffic offences, or extra taxes and fees on activities that cause environmental pollution.[590]

Law No. 8 (2008) for EPI in Kurdistan Region of Iraq includes administrative sanction as a legal mechanism to prevent pollution. Article 42 states:

> *"First: Without prejudice of any severe punishment forenamed in other laws, the dissenting of the rules of this law, regulations and instructions issued according to it, is punishable by imprisonment for a period not less than one month or by a fine not less than 150000 (one hundred and fifty thousand) dinars and not to exceed 200 000 000 (two hundred million) dinars or by both punishments.*
> *Second: Duplication of the punishment each time the offence has been repeated.*
> *Third: The Minister or his appointed person, of which position is not lower than general director, can impose a fine of not less than 100 000 (one hundred thousand) dinars and not to exceed 10 000 000 (ten million dinars) against each one who dissents the rules of this law, regulations and instructions issued according to it."*

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Recently paragraph one and three of the Article 42 has been amended [591]as follows, Paragraph 1 states,

> *"First: Without prejudice of any severe punishment forenamed in other laws, the dissenting of the rules of this law, regulations and instructions which issue according to it, is punishable by…."*
> *"Third: The Head of the Board or his/her appointed person in Environmental Administration Directorates in the governorates and independent administrations in the region, where the environmental*

[590] Mohammed Sami Alsho, *Administrative Penalty Law- In Arabic*, (Cairo: Dar Al nahda Al arabia, no year), 169; Ismail Najm Al den Al Zangana, *Environment Administrative Law-In Arabic* (Beirut: Al Halaby publisher, First edition, 2012), 340.
[591] According to Article 1, Law No.11 (2022) Law for the First Amendment of the Law No.8(2008) of the Environmental Protection and Improvement in Kurdistan Region-Iraq.

violations occur can impose the mentioned fines as texted in the first paragraph of this article with the condition that not to exceed 10 000 000 (ten million dinars).”

Although these amendments were good for implementing the rules and instructions of law No.8(2008) by the Head of the EPI Board or his/her authorized persons, the penalty remained the same, which will be discussed later in the study.

Based on the above provisions, the punishment in Paragraphs 1 and 2 of Article 42 can be implemented by the court. In contrast, Paragraph 3 may be implemented as an administrative fine by the minister who is now replaced by the Head of the Board or his/her authorized person, as mentioned. The existing administrative fine is still not effective in minimizing environmental pollution in Kurdistan. This may be because the amount of the fine is not sufficient to combat all offences. The authorized administrations also do not take into account all the environmental damages while imposing the sanctions on the polluter. Respondent 3 believes that these administrative penalties are not appropriately imposed on those who caused river pollution:

“There are some factories nearby Serwan River for example, and these factories, such as quarries had seriously damaged the river and its surrounding forest. However, the administrative penalties are not adequately imposed on the offender. For instance, the relevant institution imposed a 200,000 ID fine for the attacks by these factories on the river, when this damage has long-term negative impacts. Therefore, such ineffective sanction cannot compensate the river degradation.”[592]

[592] Respondent 3.

In addition, administrative fines are not efficient in controlling water pollution. Respondent 1, an academic and a member involved in preparing the draft for Law No. 8 (2008) for EPI, mentions the necessity to revise this law:

> *"In my opinion, it is necessary to amend Law No. 8 (2008) for Environmental Protection and Improvement to enable stricter prosecution towards water offenses; the penalties should be more robust and effective."*

Furthermore, based on the annual report by the Board for 2020, the number of environmental cases in the courts in the region in 2020 was 655 cases in Hawler, Sulaymaniyah, Dohok, Garmian and Rapareen. Meanwhile, the number of cases in the court for the year 2021 was 414 cases in the region. The number of projects that do not comply with the environmental law and regulations and faced penalties in 2020 was 33 projects. The overall amount of fines imposed throughout the year 2020 was 76.646,000 million Iraqi Dinar (ID), but this does not include all the annual income of the Board, which is in contrast to the 2021 report, which does not include the overall amount of fines for 2021 but instead includes the annual revenue of the Board which was 332,666,000 million ID.[593] The report shows that the number of penalized cases is significantly lower compared to the number of cases that go to court. However, the fine penalty on the polluters is still considered low compared to the environmental harms. Nevertheless, there are some remarkable fluctuations and differences between the number of cases and types of penalties that had been imposed throughout 2020 and 2021 (Table 5.1).

[593] Environmental Protection and Improvement Board. Annual Report of 2021.

Table 5. 1

Number of cases and types of penalties imposed by the board in 2020 and 2021.

No.	Governorate	Number of cases in court in 2020	N.C in 2021	Cases that are imposed Punishment & Fine 2020	Cases that are imposed Punishment & Fine 2021
1.	Hawler	429	48	23 cases	-Warning: 20 cases -Punishment and fine: 36 cases -Signed the pledge (promise): 478 cases
2.	Sulaymaniyah	125	356	3	-Warning: 197 cases -Punishment and fine: 151 cases -Signed the pledge (promise): 1059 cases
3.	Dohok	43	0	7	-Punishment and fine: 73 cases Signed the pledge (promise): 647 cases
4.	Garmian	2	8	No case	No cases
5.	Rapareen	56	2	No case	Written promise: 133 cases

Source: (EPI Board Annual Report of 2020 and 2021)[594]

Based on the report of the Board for 2020 and 2021, the number of cases in Hawler substantially decreased from 429 cases in 2020 to only 48 cases in 2021. In contrast to the number of cases in Sulaymaniyah, as indicated in the report, with a significant rise

[594] Environmental Protection and Improvement Board, Annual Report of 2021.

from 125 cases to 356 (2020-2021 respectively). Moreover, Dohok, Garmian and Rapareen have lower number of cases for both years, except for Dohok, which had no cases in court in 2021. Based on these two published reports by the Board, the study noted that some penalties did not exist in 2020, such as warning, while in 2021, in Hawler and Sulaymaniyah, such penalty was imposed on 20 and 197 cases, respectively.

In 2021, the number of cases with written promises to obey the rules of law was the highest compared to other types of sanctions, such as warning and fines, proving the poor enforcement of the legal penalties in the region as a written promise is ineffective compared to fines.

Additionally, the quality of data and contents of the two reports of 2020 and 2021 had some ambiguities and shortcomings, showing poor arrangement and limited insight and data on environmental issues. Therefore, it is crucial to rearrange the data quality and quantity of such annual reports to become more transparent and useful for the people and researchers.

However, in the newly issued water law, fine and imprisonment penalties have also existed to face offences relating to water pollution, including river pollution. To illustrate, Article 19 states:

> *"Anyone who violates the rules of this law except rules of Article 9, will be panelized by imprisonment for a period of not more than three months, or imposed fines not less than (7,000,000) seven*

million Iraqi Dinars and not more than (10,000,000) ten million Iraqi Dinars, or both."[595]

In terms of violation of the rules of Article 9, which is about the prohibition of activities that cause damage to the quality and quantity of water resources such as the discharge of different wastes into water resources, including industrial, agricultural, residential, and oil sectors wastes (as mentioned earlier), stronger sanctions will be imposed including imprisonment for a period of not less than six months and fines which remain the same as the previous Article (not less than seven million and not more than ten million) along with the removal of the wastes or their return to their previous place by the offender.[596] This means that three different penalties are combined to be imposed upon those who violate Article 9, including the discharge of wastes into rivers. This is a better development compared to the previous sanction under Law No. 8 (2008). Nevertheless, in the case of repeated violations of Article 9, the offender will face stricter penalties by imprisonment for a period of not less than one year and a fine of not less than (10,000,000) ten million dinars and not exceeding (15,000,000) fifteen million dinars, along with the removal of the offences by the offender.[597] The law also mentions that these penalties do not prohibit other stricter sanctions from being imposed under other regional laws.[598]

Based on these two Articles of the new water law, it is clear that the offender of this law will encounter stronger penalties. The study also noted two things about the existing sanctions under Law No. 4 (2022). Firstly, the study believes that the maximum amount of fines is still insufficient for many water violations. In other

[595] Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.
[596] Para 1, Article 20, Law No. 4 (2022).
[597] Para 2, Article 20.
[598] Para 3, Article 30.

words, it would be better to have a higher range of maximum fine as in the environmental law, because, in any case, it does not exceed (15,000,000) fifteen million dinars, which is not impactful for some industries or projects and because some water violations cause huge damage to water resources, i.e., more than the financial fine imposed. Therefore, this law needs to impose a stricter penalty than other enforceable laws in this regard. However, one concern arises: the judge or administrative institution may not impose the stricter penalty and would directly implement this law and its sanction. Moreover, many people and private sectors do not respect the rules of this law due to such fines.

Another concern is that Articles 19 and 20 do not include maximum imprisonment, except for Paragraph 1, Article 19, which states "imprisonment for a period of not more than 3 months", while Article 20 only mentions minimum imprisonment. It is better to adequately highlight the minimum and maximum periods of imprisonment to assist the judge in enforcing the law justly.

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Based on Article 10 of Law No. 8 (2008) for EPI, the Environmental Protection and Improvement Box was established in the region to spend the collected fines for environmental protection and development. However, despite this provision, this Article is still not properly enforced as the Board has limited power to collect and spend all the received income for environmental purposes. Respondent 4 said:

> *"The current situation of environmental fee collection is breaking Law No.8 (2008). This is because the Board does not receive all the environment-related fees paid to the KRG for environmental purposes. To illustrate, the Ministry of Interior takes some of the fees from drivers for the purpose of environmental protection, but does*

> *not return this money to the Board. The Board does not even know the amount. The fines decided by the court go to the Ministry of Finance, which is also not returned to the Board's box."*[599]

Additionally, the Head of the Board (EPIB) also emphasized on this issue that the Board needs to coordinate with other ministries to return the environmental fees to the Board:

> *"We are trying with some ministries to return all governmental incomes paid by the people under the title "Environmental fees". The Ministry of Interior (MoI) gained some fees under "Environmental Fees" from car or truck owners when they registered their machines. For example, 20% of these fees go to the MoI and 80% go to the Ministry of Finance and Economy (MoFE). Other environmental fees are from other ministries such as the Ministry of Natural Resources (MoNR) and Ministry of Municipality and Tourist (MoMT)".*[600]

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It is necessary to return these incomes to the Board to spend on environmental protection and improvement purposes. In other words, it is necessary to authorize the Board to take all environmental-related fees and put it in the Environmental Protection and Improvement Box to fund their projects for protecting and improving the environment in the region. To do so, it is advised to issue a new instruction about the return of environmental-related fees to the Environmental Protection and Improvement Box. Simultaneously, other ministries, particularly the MoFE, MoTI, MoMT, MoNR and MoI should efficiently coordinate with the Board to enforce the law and regulations.

[599] Respondent 4.
[600] Sadeeq, NRT Channel, 2021.

As mentioned earlier, the new water law also established the Box for Water Resources Development and Protection in the Region.[601] Based on Article 14, the income of the box comes from two sources: the allocated amount by the region's annual budget and any financial aid given to the box based on the law.[602] Here, the study notes the shortcomings of the new law in addressing the issue of returning the income gained from the imposed financial penalty due to violations of this law, as discussed in Articles 19 and 20.

Regarding the enforcement of the existing financial and non-financial penalties, respondent 4 said:

> *"To be honest, we do not impose adequate legal penalties on all environmental offenses. Lack of enforcement towards some industries due to their strong political power or relations and high amounts of fines also cause them to escape from paying."*

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Therefore, as mentioned by the study respondents above, the insufficient and poor enforcement of legal mechanisms, particularly legal penalties on some projects due to poor coordination, corruption and political powers, is another considerable barrier for the Board in achieving the goals of such administrative penalties.

5.3.1.2 Administrative confiscation

This is the type of penalty where the administration legally takes over some of the offender's properties without any compensation.[603] The Egyptian court defined confiscation as:

[601] Article 13, Law No. 4 (2022).
[602] Article 14, Law No. 4 (2022).
[603] Al-hlo, 190.

> *"The procedure that aims to transform the ownership of some things from the offender to the government; these things are related to the crime, compulsorily and without any reward".*[604]

Administrative confiscation is one of the financial administrative sanctions imposed to protect the environment. It could be imposed on specific things or groups of things relevant to the crime; it could also be optional or compulsory for the administration to impose this penalty according to the law.[605] For instance, if an industry uses certain materials that cause river pollution, the administrative authority may confiscate the said materials based on the rules of law.

Constitutionally, general confiscation is not allowed because this type of sanction is related to the right of property. Many constitutional provisions explicitly prohibit general confiscation; on the other hand, special confiscation is allowed based on court judgment.[606] The 2005 Iraqi Constitution only mentions the protection of ownership rights as stated in Article 23:

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> *"First: Private property is protected. The owner shall have the right to benefit, exploit and dispose of private property within the limits of the law.*
> *Second: Expropriation is not permissible except for the purposes of public benefit in return for just compensation, and this shall be regulated by law."*[607]

[604] Criminal Judgments, Session June 10, 1981, Collection of judgments of Elimination Court, year 32nd judiciary, No. 115, 639.
[605] Amin Mustafa Mohammed, *General Theory of Administrative Penalties Law*-In Arabic (Alexandria: Dar Almatbuat Aljamey, 2017), 221.
[606] Al hlo, 191.
[607] Article 23, Iraqi Constitution 2005.

Even though administrative confiscation as a penalty can be used to preserve the environment, it is still not widely used in environmental laws. Some legislations utilize administrative confiscation, such as Egyptian Law No. 127 (1955) revised based on Law No. 253 (1955) about the practice of medicine.[608] Furthermore, Iraqi laws use this sanction in Public Health Law No. 89 (1981), which allows the Health Censorship Authority to confiscate some materials based on the provisions of the law.

In addition, Article 101 of Federal Penal Code No. 111 of 1969 states that:

> *"...the court may, upon conviction of a felony or misdemeanor, order the confiscation of seized items obtained from the crime, used in the crime, or intended to use in it, and this is all without violating the rights of others in good faith."*

Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq do not include administrative confiscation as an administrative penalty against industries or factories that commit environmental pollution. It is important to include such penalties in environmental legislation on top of other administrative sanctions due to their effective impact in preventing pollution.

5.3.1.3 Deprivation of financial benefits

One of the financial forms of administrative penalty is the deprivation of financial privileges or benefits given to some industries or projects in order to protect the

[608] Article 64. See: Eid Mohammed Manhay Al-Manokh Al-Azmy, "Administrative Protection of Environment" (PhD theses, submitted to college of law, Alexandria University, Egypt, 2008), 116.

environment. This includes cancellation of assistance and tax exemptions previously provided to the offender.

Tax exemption, as mentioned by some countries law such as Article (39) of the Kuwait Industry Law No. 56 (1996) allows for certain industries to be deprived of some fees on their equipment and preliminary materials due to environmental rule violations to reduce pollution at the workplace or other environmental requirements.[609] Moreover, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq do not adopt this type of administrative penalty, which may be used against industries that cause river pollution.

Therefore, it is necessary to add certain financial mechanisms to encourage environmental protection or minimize pollution, particularly on rivers. Simultaneously, these financial privileges may be revoked as a penalty for violating the law. Adding such enforcement mechanisms to environmental and water-related legislations is essential.

5.3.2 Non-Financial administrative penalties

Usually, environmental legislations include some non-financial administrative sanctions that are not directly imposed on the financial status of the offender, but rather imposed on the project, which caused indirect impacts on the income or overall profit of the production. Examples of non-financial administrative penalties include warnings, legal prosecution, temporary workplace closure, license elimination, and

[609] Al-Azmy, 440; Al hlo, 193.

project removal.[610] These non-financial administrative penalties have impactful consequences in protecting the environment including rivers if enforced upon all offenders properly. The next point will discuss these types of sanctions within Kurdistan's environmental legislation and assess their enforcement.

5.3.2.1 Warning (Notification)

Warning is the easiest administrative sanction to be imposed on the offender of environmental legislations. It entails warning of the offence and its penalties, which may be imposed if the offender continues to break the law. Thus, if the offenders continue to break the environmental law, the authority would normally impose stronger sanctions, such as closing the workplace for a period of time or revoking the license.[611]

The Iraqi environment law authorizes the General Manager of the Environment Protection and Improvement Administration to notify manufacturers or industries about their violations of the environmental law or rules of safety and health to remove the factors of pollution within 10 days starting from the day of notification or warning. Failure to do so would result in a stop work order or temporary closure of the workplace for a period of not more than 30 days. However, the General Manager may suggest to the Environment Protection and Improvement Committee to halt the project permanently.[612]

[610] Mukhlif, 317.
[611] Al-hlo, 193.
[612] Para 4, Article 12 of Iraqi Environment Protection and Improvement Law No. 27 (2009).

Similarly, Law No. 8 (2008) for EPI can issue a warning to inform the project or other pollutant sources to remove the environmentally-harmful factor within 10 days of receiving the warning. Otherwise, the Board can stop the work and close it temporarily until the pollution has been fixed. Article 41 states:

> *"The Minister or his appointed agent can warn any establishment, project or any agency or environmental pollutant source to remove the harmful factor to the environment within a period of not more than ten days from the date of warning. In the case of non-obedience, the Minister (Head of the Board) can stop the work, close it and withdraw the environmental consent temporarily until the pollution has been treated; this is organized by instructions."*[613]

As noted, the warning for removing the factor of pollution remains in force for a period of not exceeding 10 days. In cases of failure to fulfill the warning, this Article authorizes the Head of the Board to stop the work temporarily, close it and withdraw the environmental permission. In accordance with this Article, the EPI Board issued Instruction No. 4 (2021) to warn and stop projects that violate the rules of law.[614]

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The objective of Instruction No. 4 (2021) is to deal with projects and activities that violate the rules of environmental law and to remove these pollutants and their impacts.[615] According to Article 3, the Head of the Board or authorized person has the right to take certain procedures against projects that violate environmental rules. As mentioned in Paragraph 1, the Head of the Board or authorized person may send a warning to the manager of the project which breaks the rules of environmental law to

[613] Law No. 8(2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.
[614] Instruction No. 4 (2021) for warning and stopping work in projects that violate the rules of law, Al-Waqai' -Kurdistan –Official Gazette of Kurdistan, No.275 on December 9, 2021.
[615] Article 2.

stop the source of pollution and remove it or stop the offence of the environmental instructions within 10 days from the day of warning.[616] The manager of the project may ask for an extension of another 10 days if the given period is not enough to remove the pollution or violation of the environmental instruction.[617]

However, in the case of continuous violations, the Head of the Board or authorized person may impose fines on the project for each day after the given period based on Paragraph 3, Article 42 of Law No. 8 (2008) for EPI.[618] Furthermore, the Head of the Board, based on the suggestion of the Director of Environmental Protection and Improvement Administration (EPIA), may decide to stop the project for 10 days if the violation continues after this period based on Article 3 of the instruction, or if the violator disagrees to fix the damage or pay the compensation.[619] Nevertheless, the Head of the Board may decide to withdraw the environmental permission for the project and close the workplace in cases of continuous pollution after restarting the activities that were previously stopped based on the report prepared by the relevant environmental institution.[620]

This instruction authorizes the Board to obligate the polluter to solve the environmental damage, pay compensation, or both.[621] Moreover, the Board may take civil or criminal lawsuit against projects or activities that violate the rules of the environmental law.[622]

[616] Para1, Instruction No. 4(2021) for warning and stopping work in projects that violate the rules of law.
[617] Para 2, Instruction No.4(2021).
[618] Para 3, Article 3, Instruction No. 4 (2021).
[619] Para 4, Instruction No. 4 (2021).
[620] Para 5, Instruction No. 4 (2021).
[621] Para 6, Article 3, Instruction No. 4 (2021).
[622] Article 4, Instruction No. 4 (2021).

Moreover, based on the 2021 Board report, 356 cases have been registered in court in the Sulaymaniyah governorate alone. A total of 197 cases received warnings due to environmental rule violations, 151 cases were panelized, and 1059 cases were given written promises not to perform such violations again.[623]

5.3.2.2 Stop working

Temporarily closure of the workplace or stopping the activity of the project can be used by the administrative authority based on the environmental legislation. This is considered a temporary penalty until the removal of the pollution factor and its harms by the offender.[624] This penalty has powerful impacts on projects or industries that cause pollution. Apart from being an original administrative sanction imposed by the administration, it is also imposed by the judge to complement the criminal penalty.[625] Many examples of this type of sanction exist, especially in environmental legislations. For example, Egyptian Environment Law No. 4 (1994) in Article 74 allows for a stop work order for activities or projects that affect the natural condition of beaches or seawater more than the set legal border.[626]

Likewise, Law No. 27 (2009) for Environmental Protection and Improvement gives the Minister of Environment or any other authorized person to issue a warning for any industry or project which causes pollution to prevent the factor of pollution within 10 days from the issuance of the warning or notification; otherwise, the Minister has the authority to issue a stop work order or temporarily close the project's workplace for a

[623] Environmental Protection and Improvement Board, Annual Report of 2021.
[624] Eid Mohammed Manhay Al Manokh Al Azmy, 433.
[625] Raaf Mohammed Labeb, *Procedural Protection of Environment from Censorship to Trail- In Arabic* (Cairo: Dar Al Nahda Al Arabia, First edition, 2009.), 258.
[626] Article, 74, Egyptian Environment Law No.4 (1994).

period of not more than 30 days, which may be extended until the removal of offence.[627]

Article 41[628] also adopts this administrative penalty, which is imposed if the project, upon receiving a warning, fails to remove the source of pollution or harm within a period of not more than 10 days in Kurdistan. Here, the Head of the Board may impose a fine on the project for each day after this period based on Paragraph 3, Article 42 of Law No. 8 (2008) for EPI. In cases of continuous pollution by the project after the set period, or if the project refuses to fix the damage or pay the compensation, the Head of the Board, based on the suggestion of the Director of the Environmental Protection and Improvement Administration in the Region (EPIA) may issue a stop work order for the project for a period of 10 days. The Head of the Board may also withdraw the environmental permission and close the workplace according to Instruction No. 4 (2021) for violating the rules of law.[629]

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Based on the discussion above, instruction No. 4 of 2021 is a positive move in clarifying Article 41 of Law No. 8 (2008) for EPI regarding punishments against projects that violate the environmental rules. It is better to authorize the Director of EPIA instead of the Head of the Board to decide on the stop work order, withdrawal of environmental permission, and closure of the project's workplace according to Paragraphs 4 and 5 of Article 3 of Instruction No. 4 (2021). This is because centralism causes more red tapes and takes longer, which is unsuitable for environmental issues.

[627] Para 1, Article 33.
[628] Law No. 8 (2008) of Environmental Protection and Improvement of Kurdistan Region of Iraq.
[629] See Para 3,4 and 5, Article 3, Instruction No. 4 (2021) for warning and stopping working in project that violate rules of law.

In contrast, the relevant environmental institution director is nearer to the project and could take legal action immediately.

Furthermore, based on Paragraphs 4 and 5 of the instruction, the Head of the Board is free to decide whether or not to close the workplace, as the provisions use the phrase "the Head of the Board may". Therefore, it is better to change the word "may" to "must" to make it compulsory for the Head of the Board to issue a stop work order for 10 days if the violation continues or if the environmental damage is not foxed or the compensation is not paid. Likewise, it is necessary to obligate the Head of the Board to close the project and withdraw its environmental license based on Paragraph 5 of the instruction.

Therefore, stop work order and withdrawal of permission are effective environmental penalties to control industries and factories that do not comply with the environmental rules. This is because many industries nearby the Tanjero River and quarry factories nearby the Serwan River cause river pollution.

5.3.2.3 License revocation

Cancelation of license is one of the administrative sanctions that may be imposed on the offender by the administrative authority due to environmental legislation violations.[630] License cancelation means the end of the permission given to conduct industrial activities. It is considered one of the toughest non-financial administrative penalties that can be adopted in environmental laws in dealing with environmental legislation violations. However, the authority of the administration usually has limited

[630] Eid Mohammed Manhay Al Manokh Al Azmy, 448.

powers in issuing license cancellation because the law determines the conditions of cancellation, as well as the conditions of providing it.[631]

This sanction can be used to protect water from pollution. For example, Article 74 of the Egyptian Environment Law No.4 (1994) gives power to the special environmental institution (which has the authority to give permission to discharge wastewater into the water environment) to cancel the license if it has been proven that the project did not follow the legal environmental standards for wastes based on the regular wastewater samples experiment.[632]Additionally, there are some other environmental laws in Arab countries that do not include the penalty of license cancelation for premises that violate the environmental laws, such as the Law of Environment of Libya of 2003.[633]

In Iraq, the Environmental Protection and Improvement Directorate (EPID) has the authority to issue permission for projects after they have submitted their EIA report. Meanwhile, this institution does not have the power to cancel the license of the same project. However, it may solely recommend to the Environmental Protection and Improvement Board to decide about permanent closure. The main Board could issue the decision about the suggestion from the EPID or Governorate Council of Environment Protection and Improvement to issue a stop work order or to close the project's workplace and cancel its license due to violations of health and safety standards.[634]

[631] Majid Raghib Hlo, *The Law of Environmental Protection in light of Sharia- In Arabic* (Alexandrea: Dar Al Jamea Al jadeda,2012.), 197.
[632] Al-hlo, 2012, 198.
[633] Khalifa Al frjani Khalifa Krfah, "Administrative Protection of Sea Environment from Pollution" (Master these submitted to the college of law, Alexandrea University, 2013), 149.
[634] Para 1, Article 6, the Law of Environmental Protection and Improvement No. 3 (1997) modified by the Law No. 73 (2001).

The Iraqi legislature recognizes the authority to issue the decision for license cancelation for the EPID based on the Regulation of Water Resources Protection No.2 (2001). Meanwhile, as mentioned earlier, such authority is not given to the EPID based on Paragraph 1, Article 6 of Law No. 73 (2001) for Environmental Protection and Improvement to use this administrative sanction; it can only issue a stop work order and temporarily close the premises.[635] This is a contradiction in the said Iraqi legislature, once giving the authority to cancel the license to EPID based on Regulation No. 2(2001), once depriving it based on Article 6 of Law No. 73(2001). There is no logical legal justification for this when the EPID has the authority to issue the permission. Hence, it is better to revise Paragraph 1 of Article 6 to authorize the EPID to cancel or end the permission, especially since it is nearer to the project. This is subject to the license and acceptance of the EIA report by the EPID, which can closely monitor the project to identify its environmental impacts and take immediate actions to close it and cancel its license compared to the EPIB.[636]

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Based on the above discussion, it is clear that Law No. 27 (2009) of Environmental Protection and Improvement does not adopt the practice of license cancelation. Meanwhile, Law No. 8 (2008) for EPI in Kurdistan Region has an ambiguous stance about license cancelation, although it recognizes the issuance of a stop work order. Article 41 states:

> *"In the case of non-obedience, the Minister can stop the work, close it and withdraw the environmental consent temporarily until the pollution has been treated, and this is organized by instructions."*[637]

[635] Mukhlif, 321-322.
[636] Sanger Dawod Mohammed, *Administrative Settlement for Environment Protection-In Arabic* (Cairo: Dar Al shatat Publisher, 2012.), 256.
[637] Article 41, Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq.

The Kurdistan legislature uses the phrase "withdraw license as a temporary procedure", which is different from license cancelation as it is a permanent move. Thus, the minister or the Head of the EPIB could issue a stop work order and withdraw the license until the removal or treatment of the cause of pollution by the industries or projects. Furthermore, the Kurdistan environmental law states in Article 41 not to explicitly organize the conditions for imposing license cancelation but rather leave the details to the instruction.

Recently, as mentioned in Instruction No. 4 (2021), the Head of the Board may issue an order to cancel the environmental license and close the workplace if the project continues to cause pollution after restarting their previously halted activities based on the report from the relevant EPIA in the region.[638] Hence, the Head of the Board is not obligated to cancel the permission for the project and close its workplace.

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However, Instruction No. 4 (2021) via Paragraph 5, Article 3 does not explicitly tell us whether the closure of the workplace and withdrawal of permission is temporary or permanent. Nevertheless, based on previous provisions of this instruction, it could be understood that the legislature in Paragraph 5 is the toughest punishment, i.e., license cancelation. However, Article 41 can be revised and made clearer to empower the administrative authority in tackling the sources of pollution in the region. The study recommends the following for the provision of Article 41:

> *"The Minister or his appointed agent can warn any establishment, project or any agency or environmental pollutant source to remove the harmful factor to the environment within a period not exceeding*

[638] Para5, Article 3, Instruction No. 4 (2021).

ten days from the date of the warning. In the case of non-obedience, the Head of the Board must stop the work temporarily for a period not exceeding 30 days. In the case of non-obedience, the Head of the Board or authorized person must close the workplace and cancel the environmental consent permanently and this is organized by instructions."

Nevertheless, based on Paragraph 6 of the instruction, the Head of the Board or authorized person may obligate the offenders to fix the environmental harms, pay compensation, or both. Simultaneously, the board or authorized person may take civil or criminal actions in court against the projects that violate the environmental rules.[639] Finally, based on Articles 6 and 7 of the instruction, relevant authorities must enforce this instruction from the day of issuance.

5.3.2.4 Removal of violation

Removal as one of the administrative penalties means removing the consequences of the law violation.[640] The administrative penalty for environmental protection and improvement means removing projects, activities or pollutants that cause environmental damage based on the decision made by the relevant environmental administration if the offender does not take action to remove sources of pollution within a set period of time in order to prevent it from becoming a danger to the environment.[641] This is considered one of the most powerful and toughest administrative sanctions for protecting the environment, as it causes complete and permanent elimination of the existing project.[642] This sanction usually comes in

[639] Article 4, Instruction No. 4 (2021).
[640] Al-hlo, 2012, 200.
[641] Al-Azmy, 455.
[642] Krfah, 150.

environmental legislations after a temporary stop work order, closure of workplace, and cancelation of license[643] to control and prevent the pollution factor.

This penalty greatly impacts protecting the environment in some issues such as urban environmental issues, antique environmental issues, public roads, and public property of state.[644] It can be imposed in cases of water pollution, such as river pollution by various human factors such as industry, oil projects, quarries, etc. It is vitally important to save the Tanjero River from the violators of the existing environmental laws and regulations to prevent direct discharges of wastes into the river, since these projects and activities pose human risks and cause environmental catastrophe.

Additionally, the Serwan River has also been damaged by the quarry factories nearby. There is an urgent need to remove these projects which cause river degradation or river basin transfer to other places. Other countries also adopted this administrative sanction to protect their environment, including water resources. For instance, the Law of Environmental Protection No. 42 (2014) revised by Law No. 99 (2015) in Kuwait states that offenders should remove the sources of pollution or environmental harm using their own expenses.[645] The Jordanian Law No. 52 (2006) for Environmental Protection mentions the right to "Environmental Authority" to eliminate any activities that cause pollution.[646] Furthermore, Egyptian laws have used this penalty in different environmental laws, such as Law No. 4 (1994) for the Environment.[647] Other laws

[643] Al-Azmy, 455.
[644] Al- hlo, 201.
[645] Article 134, Law of Environmental Protection No. 42 (2014) revised by Law No.99 (2015) accessed on February 19, 2022, https://epa.org.kw/#About
[646] Article 7, Jordanian Law No.52 (2006) for Environmental Protection, accessed on February 19, 2022, https://ammannet.net/
[647] Article 73 and 74, Law No. 4 (1994).

using this penalty include Law of Nile River and Sewer System Protection No.48 (1980),[648] and Law of Public Cleanliness No. 38 (1967) as revised by Law No.10 (2005).[649]

In Law No. 8 (2008) of Environmental Protection and Improvement, the polluter is responsible for paying compensation and removing the pollutant and its adverse environmental consequences. Article 21, Paragraph 1 states:

> *"First: Anyone who causes environmental impairment, by his own action, negligence, or by the action of whom are under his care, observation, or control from persons or followers, or by dissenting the laws or regulations and instructions is responsible, and he is obliged to compensate, remove the impairment and return the state as it was before, during a period of time limited by the Ministry and according to conditions put by it. In the case of neglecting or not submitting to perform it, the Ministry, after notifying them, can take over the procedures and action to remove the impairment and the causer tolerates all the loss for this purpose, in addition to the administrative costs with respect to the following standards:*
> *1-Dangerous degrees of types of polluted substances.*
> *2-The effect of pollution on the environment now and in the future."*

Paragraph 3 refers to the implementation of the Iraq Civil Law about rules of responsibility that are not stated in this law. Removal is usually imposed after a warning is issued to the polluter to remove the factor of pollution and its effects; however, in some cases of urgent and essential damage, the administrative authority can directly remove the project to control the pollution and its impacts.[650]

[648] Article 3, the Law of Nile River and Sewer System Protection No. 48 (1980).
[649] Article 9, Law of Public Cleanliness No. 38 (1967) which revised by Law No. 10 (2005).
[650] Al-hlo, 201.

Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq also added this penalty to ask the offender to remove the violations, including wastes and pollutants, as mentioned above.[651] Therefore, the enforcement of this sanction is fundamentally important to eliminate all illegal projects that cause pollution to the river in the region. However, the existing relevant authority has still not enforced this mechanism adequately and effectively against projects that cause environmental damage, including the Tanjero River pollution.

5.3.2.5 Prohibition of utilizing some equipment and dangerous materials that cause pollution

Some legislations include provisions that authorize the environmental administrative authority to prevent the usage of certain equipment or substances, such as chemicals or materials that harm the environment or human health[652] , such as the Kuwait Environmental Law.[653] Therefore, with strict enforcement, this penalty has the potential to control or limit some factors of river pollution and is very effective if properly enforced to control water resource pollution such as the Tanjero River.

In addition, Law No. 4 (2022) for Water Management and Protection of Kurdistan Region-Iraq also prevents the utilization of certain equipment or materials that cause water resource pollution, including pesticides, weapon materials, electric power, poison materials and so on.[654] Therefore, stricter enforcement of environmental laws and rules is highly necessary to prevent all human threats to water resources.

[651] Para 1 and 2, Article 20, Law No. 4 (2022) for Water Management and Protection of Kurdistan Region of Iraq.
[652] Rashid, 242.
[653] Article 21, Law of Environmental Protection No. 42 (2014) revised by Law No. 99 (2015) accessed on February 19, 2022, https://epa.org.kw/#About
[654] Para 6 and 8, Article 9, Law No. 4 (2022) for Water Management and Protection of Kurdistan Region of Iraq.

5.3.2.6 Legal prosecution against responsible employees

Some scholars mention other types of sanctions that could be imposed upon employees[655] legally in charge of protecting the environment, whether in the field of enforcement of environmental laws or censorship by regular monitoring of projects that may cause pollution, or employees working in governmental public projects that pose pollution such as oil projects and so on.[656] This administrative sanction has a powerful impact on preserving the environment, including rivers, because it renders governmental environmental institutions to conduct their legal duties efficiently.

Although Law No. 14 (1991) for Regulating Iraqi Employees has eight types of penalties that may be imposed on employees for their crimes or violations of the law, they are not properly applied to governmental employees who had failed to fulfill their environmental tasks in preventing pollution. Such penalties, if implemented effectively, may boost their performance in monitoring river situations and preventing pollution or at least taking legal prosecutions against them, which has positive impacts on the environment.

To this end, all administrative penalties should be added to Law No. 4 (2022) for Water Management and Protection in Kurdistan Region-Iraq and Environment Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan region in a clear and adequate manner to prevent pollution or minimize it to allowable levels, particularly in the case of the Tanjero River pollution. However, the impacts of any legal penalty pertinent to its rigorous enforcement should be equal for all violators of

[655] For example, there are eight types of sanctions that may be imposed on employees in Iraq based on Law No 14 (1991) for Regulation State employees.
[656] Al-hlo, 193.

the environmental law based on the relevant governmental institution's jurisdiction. This study will assess the legal responsibility of other governmental ministries in the region based on their jurisdiction to highlight their role in combating river pollution particularly in the case of the Tanjero River.

5.4 Analysis

The agenda of the current KRG cabinet emphasizes the protection of water and rationalizing its usage to enable access to clean water for the people.[657] Furthermore, this agenda also refers to the protection and improvement of Kurdistan's environment and the elimination of environmental threats through the adoption of a modern recycling system.[658] Therefore, all ministries and government institutions as an organ of the KRG based on their jurisdiction have constitutional and legal mandates to be involved efficiently to prevent or minimize river pollution.

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As mentioned earlier, the issue of water requires a multidimensional approach, which might lead to the involvement of different government institutions. In Kurdistan, apart from having main government institutions for environmental protection and improvement, the region also has different ministries involved in protecting and improving water resources, including rivers. (Table 5.2)

Table 5. 2

Legal framework of river protection in the Kurdistan Region of Iraq (KRI).

No	**Institution**	**Law**	**Scope**

[657] Outlines of new cabinet agenda, Services, Fourth, accessed July 25, 2020, https://gov.krd/english/government/agenda/ .
[658] Ibid.

1.	Environmental Protection and Improvement Board in Kurdistan Region- Iraq.	Law No. 3 (2010) An act for the Kurdistan Region–Iraq Board for the Protection and Enhancement of the Environment.	The main objective is to maintain and enhance Kurdistan's environment and prevent pollution or other activities which pose danger for the ecosystem and human health.
2.	Ministry of Trade and Industry (MoTI).	Law No. 10 (2010) of the Ministry of Trade and Industry in Kurdistan Region of Iraq.	The main objective is to make and implement trade and industry policies to reach economic and social development in the region.
3.	Ministry of Natural Resources (MoAWR).	Law No. 21 (2007) for the Ministry of Natural Resources in Kurdistan Region of Iraq. Law No. 22 (2007) an Act for the Kurdistan Region-Iraq Oil and Gas.	The ministry should work to develop oil industry in a way that reduces environmental damages to achieve a sustainable economy.
4.	Ministry of Municipalities and Tourism of the Kurdistan Region-Iraq	Law No. 12 (2010) on the Ministry of Municipalities and Tourism of	The main objective of the ministry is to provide municipal and tourism services to secure the

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		the Kurdistan Region-Iraq.	residents' needs for drinking water, sewerage and drain system, and filtering station or water treatment plants.
5.	Ministry of Health (MoH)	Law No. 15 (2007) for the Ministry of Health in Kurdistan Region of Iraq.	To maintain the safety and health of the people in the Kurdistan region through some measures and tools to prevent and curb diseases.
6.	Ministry of Agriculture and Water Resources (MoAWR)	Law No. 6 (2010) for the Ministry of Agriculture and Water Resources in Kurdistan Region of Iraq. Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq.	To set a strategic plan and policy to invest and improve agriculture and water resources, including protecting water quality and preventing pollution.

Source: Researcher

As Table 5.2 illustrates, the legal responsibilities of water protection include rivers distributed across different governmental institutions and ministries. This is because different factors from different sectors cause river pollution. The study investigates whether these relevant agencies contribute to water protection directly or indirectly.

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As the study noted, although they have a legal responsibility towards river pollution prevention, they do not effectively enforce the law. This issue is discussed further below:

(a) Lack of enforcement

It is undeniable that industrial activities are the main challenge for water resources, since the rivers in many countries, including in the Kurdistan region, are highly polluted by wastes from industrial activities. The MoTI under Law No. 10 (2010) of the Ministry of Trade and Industry in Kurdistan Region of Iraq is one of the institutions responsible for combatting environmental destruction due to industry activities, particularly river pollution, as in the case of the Tanjero River.

Besides that, the oil and gas industry is another fundamental barrier to the environment, including rivers. Thus, the MoNR also has a legal mandate under Law No. 21 (2007) for the Ministry of Natural Resources in Kurdistan Region of Iraq and Law No. 22 (2007) for Oil and Gas in Kurdistan Region of Iraq to minimize the environmental damage and pollution while developing oil projects. In fact, oil pollution highly contributes to the Tanjero River pollution as highlighted in the previous chapter of the study.

Similarly, municipality services such as the quality of sewer systems, drain infrastructures and other related services, including the treatment of wastewater, cause challenges for river water quality. In the case of the Tanjero River, the sewer of Sulaymaniyah city is considered one of the main factors of the river's pollution. Illegal connections to the public water network and poor water services have also contributed

to the significant amount of water wastage. Based on the report by MoMT, about 50% to 60% of the distributed drinking water had been lost due to water leakages and illegal private connections to the public grid.[659]

Therefore, the MoMT has a legal commitment under Law No. 10 (2010) of the Ministry of Trade and Industry in Kurdistan Region of Iraq to develop sewer infrastructure, water treatment, water reuse, water loss prevention and provide clean water for everyone. However, in reality, as noted by the study, the MoMT is still implementing the policy under its jurisdiction in a poor manner.

In addition, the MoH under Law No. 15 (2007) is tasked to protect public health and prevent diseases, as river pollution undoubtedly brings dire consequences and human catastrophe. Respondent 2[660] highlighted the negative impacts of industrial wastes on the Tanjero River, the aquatic life, and the health of the society in Kurdistan:

> *"In our study on Tanjero River, we found industrial wastes such as heavy metals. This waste has causes water contamination and damaged aquatic life, killing thousands of fishes and other organic life. Although the level of heavy metal is still low, the bioaccumulation inside the body of the fish could damage it and cause diseases for people who consume the fish. Similarly, the polluted water with industrial wastes deteriorates water quality in the Darbandikhan Dam, which is the main source of drinking water for people in Darbandikhan city."*

[659] Tinti, 3.
[660] Respondent 2.

The respondent[661] also pointed out the impact of the polluted water from the Tanjero River, which poses health risks and diseases among the residents and aquatic life:

> *"We did a questionnaire survey among the residents nearby Tanjero River. We found that the polluted water has affected people's health. Some dangerous diseases appear among the people. Besides that, their animals and agriculture have also been affected. Although the quality of water is still at an allowed range and the level of heavy metals is low, they have negative impacts on the fishes and other biological diversity because the bioaccumulation process inside the body of the fish renders it* non-eatable or causes illnesses to those who eat the fish."

Respondent 2 highlighted health risks, which are the outcomes of serious pollution at the Tanjero River. Similarly, respondent 15 (community leader) of the study affirmed that the river is not safe for human use, such as swimming and fishing. As he said,

> *"In the 1990s the river was clean and safe, we were coming to the river for swimming, fishing or even use for drinking purposes, but nowadays it is not acceptable for these purposes due to serious water pollution."*[662]

This raises questions about the legal commitments of the MoH. Furthermore, as previously discussed, medical waste also causes river pollution and environmental degradation. This is because the MoH does not manage the medical wastes scientifically due to poor law enforcement, poor coordination, and lack of financial and technical expertise.

[661] Respondent 2.
[662] Respondent 15.

The MoH should enforce some legal mechanisms to prevent pollution, particularly by medical waste such as in the case of the Tanjero River. The MoH supervises public and private hospitals through certain mechanisms, such as licensing, which is only given to the hospitals when they have fulfilled the environmental requirements regarding waste management. However, the ministry may impose legal sanctions on these hospitals and other health institutions that cause environmental pollution. Therefore, stricter law enforcement may be useful to prevent or minimize river pollution by health-related wastes. The contribution of the agricultural sector also contributes to the pollution of the Tanjero River. Thus, sustainable management of the irrigation system strongly influences the quality and quantity of water resources, including surface and groundwater are required. The MoAWR under Law No. 6 (2010) for the Ministry of Agriculture and Water Resources in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq plays a significant role in managing the agriculture and water resources in the region. However, the MoAWR is still showing a poor performance in developing agriculture and water resources. This is due to the fact that the region is still using the traditional irrigation system, which causes water wastage. Farmers are also not adequately supported to practice agricultural activities in a sustainable way to protect water quality and quantity.

Additionally, the MoAWR is facing problems in supplying water resources for agricultural purposes, establishing sustainable management of agricultural waste, and building sufficient water storage capacity. Iraq and Kurdistan are currently suffering from inadequate water supply or drought due to the lack of rain, the neighboring water projects by Turkey and Iran, and the poor water storage system by the Ministry.

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Nevertheless, water protection requires institutional preparation. Regarding the responsibility of the Board and the MoAWR, respondent 10[663] said:

> *"The Board is mainly in charge of water quality protection, while the quantity is under the responsibility of the Ministry of Agriculture and Water Resource. Similarly, the Ministry also has teams to monitor water quality."*

Meanwhile, based on Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq, the MoAWR is in charge of water quality and quantity management. The role of the MoAWR in water management has been criticized by the respondents of the study. Respondent 3 said:

> *"Unfortunately, the MoAWR is not seriously concerned about water resources. It is only concerned about water storage or water collection. There is still no strategic agriculture project in the region. Furthermore, the Ministry does not take responsibility for the water quality issues. I have never seen the Ministry issuing water reports or taking legal action against those who pollute water or contaminate rivers. Therefore, they are not taking full responsibility."*

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Respondent 12 confirmed the negative impacts of industrial activities on the surface and groundwater quality in the Tanjero River area:

> *"Yes, the pollution of surface water has impacts on groundwater pollution, but this issue needs to be studied scientifically."*

The study then inquired about the role of the Directorate of Underground Water in Sulaymaniyah under the MoAWR in terms of the regular testing of underground water

[663] Respondent 7.

quality, especially in the industrial area. The respondent mentioned their limited capability to monitor water quality due to lack of technical and financial support:

> *"As our Directorate does not have any laboratory, we use other laboratories for testing the water sample from Sulaymaniyah University or the Directorate of Public Health Protection. The process of testing water quality needs financial and technological support. We do not have enough support from the government. We tested one sample from two places but surprisingly found different results. This means that we need more development technology and support because some water samples should be sent to Baghdad as some tests are not yet available in Iraq."*

Additionally, respondent 14, who is a resident in the Tanjero River area was inquired about the quality of underground water and its monitoring:

> *"We have wells in our house; committees come to test the underground water from our well, or sometimes we take some water as a sample to the relevant authority to test its quality."*

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She further said:

> *"The government gives us chlorine to put in our water tank, because they told us the water may be used for cooking but not suitable for drinking purposes."*[664]

According to respondent 14, the provision of chlorine by the government to households to curb poor water quality is actually a problematic move because the utilization of chlorine requires expertise about how and when to use it; exceeding the scientific standard would cause negative impacts.

[664] Respondent 14.

However, as mentioned earlier, water shortage is a serious challenge that should be taken into more serious consideration in the region. Respondent 12 highlighted the factors of water shortages, such as drought, well drilling, and water wastage:

> *"Yes, the level of underground water has been declining in Kurdistan. There is a strong relation between the rate of rainfall and underground water level. However, underground water decreases continuously mainly due to the increase of well drilling and water wastage."*

The respondent further mentioned the negative effects of illegal well drilling on water resources:

> *"Yes, some people are illegally drilling wells, which further damages the underground water's quality and quantity. It would be better if the well drilling proceeds according to the legal process, because we oversee the drilling process based on some guidelines to minimize environmental impacts on the soil and groundwater, and we even guide them on how to use this water."*

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Illegal well drilling causes a depletion of underground aquifers.[665] The MoAWR should rigorously enforce the law, particularly after the issuance of the new water law, since it authorizes the Ministry to protect and improve water resources in the region. The MoAWR is the agency responsible for providing the license to drill wells. In brief, lack of law enforcement by all the relevant institutions causes river pollution and other environmental degradation. On the other hand, poor coordination among these ministries or water-related agencies exacerbates the problem.

[665] Respondent 12; Tinti.

(b) Poor coordination

As clearly seen from the current situation of water management in the region, relevant institutions do not coordinate actively to protect rivers from various manmade pollution. Respondent 13 also emphasized the necessity of cooperation among different governmental institutions in preventing river pollution:

> *"The Ministry of Agriculture and Water Resources in Iraq and the KRG, along with the Environmental Board and Municipality should take responsibility for tackling the water challenge. Some other ministries have indirect environmental responsibility to protect rivers, namely the Ministry of Trade and Industry and the Ministry of Health because medical wastes also contribute to the Tanjero River pollution."*

The respondent suggested intergovernmental coordination in the region through regular meetings and conferences, particularly with the municipality:

> *"These agencies should seriously coordinate with the Municipality, because the Municipality is related to environmental protection. It is necessary to have regular meetings and conferences among these agencies."*[666]

It is necessary to develop effective coordination between the Iraqi Federal Government (FGI) and the KRG in facing the internal and external water challenges. While the FGI is facing political instability and corruption, the fundamental environmental challenge has remained overlooked by the government. Respondent 4[667] further explained the impacts of political instability in Iraq on the environmental situation:

> *"Iraq has the Ministry of Environment and Health, the Ministry of Agriculture, and the Ministry of Water Resources. Although these institutions have more technical and financial support compared to*

[666] Respondent 13.
[667] Respondent 4.

the region's institutions, they are not successful in managing their tasks and responsibilities regarding river protection, which may be due to some barriers, particularly the Iraqi security situation. For instance, the Iraqi-Iran war from 1980 to 1988 and the ISS war in 2014 had caused huge environmental catastrophes including river pollution and financial crisis."

Respondent 4 highlighted another political factor that influences the internal relationships between both the federal and regional governments regarding natural resource management, particularly water:

"The Iraqi government has a poor role in water protection in the region. For instance, based on the Iraqi constitution, the federal government has water management responsibility in relation to international rivers and some big dams, including those located in the region. But, the federal government has not even paid the salary of the dam employees. Constitutionally, it must pay their salary since the management of national dams is under the federal authority. Therefore, political factors negatively affect the relationship and coordination between regions and federal governments on economic and environmental issues."[668]

Therefore, the federal government has a constitutional mandate to carefully manage Iraq's water resources in facing the expected water scarcity due to external challenges (e.g., climate change and transboundary water projects by neighboring countries) and internal challenges (e.g., poor water management). To do so, both governments should seriously consider water problems including river pollution. Therefore, it is urgently necessary to have effective coordination for developing comprehensive water

[668] Respondent 4.

management to enable access to clean water for everyone as a significant human right that has an impact on the fulfilment of other human rights.

(c) River protection fragmentation

As mentioned by respondent 3, the existing water-related legislations have fragmented water management among different government institutions. Regarding the impacts of such a water management model, Respondent 3 criticized the Iraqi government and the KRG:

> *"Administratively, it is a big mistake that different ministries are in charge of the water case. Each ministry manages water differently for different utilization. For instance, the license for drilling wells is provided by more than one institution, including the Ministry of Municipality and the Ministry of Agriculture. It is advisable to give all powers to one institution to manage water quality and quantity, and this main institution will provide powers to other institutions below it."*

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Therefore, river protection fragmentation leads to poor enforcement of water-related rules to control river pollution by preventing it or minimizing it due to lack of coordination among relevant responsible institutions.

5.5 Conclusion

The existing environmental and water-related law includes some enforcement mechanisms for controlling river pollution. These mechanisms include certain legal mechanisms such as prohibition, obligation, licensing, reporting, and enticement. Environmental administrative penalties are also effective mechanisms that can help preserve rivers from pollution. These sanctions may be financial or non-financial, from

warnings, stop work orders, canceling of license, removal, prohibition of certain substances or equipment, and legal prosecution against responsible employees. The study notes that the current environmental and water legislations, such as Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region-Iraq, still not comprehensive enough to shape sustainable system to prevent and control river pollution and overcome multidisciplinary water barriers. The existing laws and regulations do not adequately include all of these administrative mechanisms necessary for curbing river pollution. However, Law No. 4 (2022) for Water Management and Protection in Kurdistan Region-Iraq is better in terms of river protection to a certain extent. Moreover, the study noted some barriers, such as poor coordination among government institutions, and the lack of enforcement of the available mechanisms by the board and other ministries according to their jurisdiction. The poor enforcement of these mechanisms paves the way for more river protection degradation in the region, such as in the case of the Tanjero River.

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CHAPTER SIX

RECOMMENDATIONS AND CONCLUSION

6.1 Introduction

This chapter ends the thesis with crucial conclusions regarding the findings and recommendations based on the study. The problem of river pollution in Kurdistan remains unresolved, thus requiring fast action and attention from all the stakeholders. Until now, Kurdistan still employs a traditional waste management system. Based on published data in 2021, Kurdistan generates approximately 2,550,000 million tons of solid waste annually or 7000 tons daily.[669] Municipal solid wastes dumped nearby the Tanjero River are among the main threats to the environment, causing challenges for water resources in Kurdistan. Without a proper recycling system or landfilling process, this problem poses risks to human health due to leakage or contamination with various materials, including medical wastes. Thus, it is hoped that Kurdistan will have a better preservation system for its rivers in terms of legal framework and enforcement in order to ensure that all rivers in Kurdistan are sustainable and environmentally-sound for the future generation.

[669] Refer to Chapter Three.

6.2 Summary of Findings

Although water resources are massively beneficial for the entire ecosystem and the well-being of humans, human activities today are increasingly causing serious water pollution, particularly on surface water such as rivers and lakes. Population growth, urbanization, and rapid industrialization accelerate the demands for natural resources, including water, for socio-economic development. Therefore, the sustainable management of water resources, particularly river pollution prevention and control, requires international, regional, and national efforts and cooperation to face the water challenges and provide sustainable solutions for them. The study hence highlights some critical findings as follows:

6.2.1 International Conventions to Control River Pollution

The study found that some of the existing principles and guidance on the legal framework for preserving natural resources have been promoted at the global level through international conventions and declarations.[670] Even though there is no specific convention on river pollution, the study concluded that this matter is governed under the legal framework on water resources. As a result, the problem of river pollution is considered a state matter which requires active action from the government and related institutions to curb it effectively.

The right to access clean water and sanitation has been recognized explicitly by the United Nations General Assembly (UNGA). This is based on resolution 64/292 which was passed on July 28, 2010. Even though UNGA was passed more than 13 years ago, the study discovered that more than two billion people are still suffering from the lack

[670] Refer to Chapter one and Two.

of clean water supply and sanitation. It is also estimated that half of the world's population is expected to live in areas with water scarcity by early 2025, and 700 million people may be displaced by 2030 due to severe water scarcity. The important massage with regards to water and sanitation can be found under Sustainable Development Goal (SDG) No.6 which aims to "ensure availability and sustainable management of water and sanitation for all".[671]

However, the study found that the implementation of SDG 6 in Iraq has yet been achieved by the Government of Iraq. The problem of polluted rivers remains unchanged even by the end of this study due to poor FGI and KRG water policies, planning as well as coordination of river management among institutions.

6.2.2 Water Protection under the Iraqi Constitution

Due to climate change, most countries in the Middle East region including Iraq are facing water challenges which poses severe drought and water shortage. The reduced rainfall and snowfall and a noticeable decrease in water resources affected the Iraqi economy, particularly the agricultural sector as a result of droughts and growing desertification. Thus, if no appropriate solutions are taken by the government of Iraq now, the country will face serious water problems in the future. The federal government of Iraq is responsible for overcoming and managing Iraq's water resources in facing the expected water stresses due to climate change and transboundary water projects by neighboring countries.

[671] Refer to Chapter Two.

The right to access clean water is not clearly stated under the Iraqi constitution. However, based on Paragraph 1 of Article 33 of the Constitution, it is stated that every person has the right to live in a safe environment. Even though the right to clean water in Iraq is fully under the environmental rights, which require the state to ensure and guarantee environmental and biodiversity preservation based on the constitution (Paragraph 2, Article 33), this right needs to be clearly stated under the provision for the improved protection of the people of Iraq.

Based on the Iraqi 2005 Constitution (Paragraph 8, Article 110), the Federal government of Iraq (FGI) has power to make water planning and policy for water resources that flow from outside of the country's sovereignty. The transboundary water issues by the neighboring countries need to be tackled by the federal government's purview. Based on this study, the FGI is still unable to solve the problem of river pollution due to poor and non-sustainable water management as well as the inadequacy of the current policy planning for preserving rivers.

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6.2.3 Legal Framework to Control River Pollution in Kurdistan

The study found that rivers such as the Tanjero River have been polluted by different sectors via industrial, sewerage, municipal, medical, and agricultural wastes. There are two main legislations relevant to river pollution prevention and control namely:

(a) Law No.8 (2008) for Environmental Protection and Improvement in Kurdistan

Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq is the main environmental law. Three articles for the purpose of water resources

protection and improvement are governed by Articles 22, Article 23, and Article 24. However, the study concluded that these three provisions are not adequate legal safeguarding mechanisms for preventing water pollution and river pollution in Kurdistan.

Regarding water treatment standards, the study found that the provision of Article 22 does not explicitly identify the required standards for treatments before discharging wastes into water resources. Furthermore, this provision does not recognize the pollution sources such as industrial, agricultural, household, or sewer wastes. These sources carry different pollutants and consequences, requiring different legal mechanisms, but the legislature merely grouped the various wastes in one general provision.

Article 23 of this law highlights the different standards that should be established for surface, ground, and potable water by issuing specific regulations. However, the study found that further clarification on “regional standards” are missing for managing water quality and quantity, for underground or surface water including rivers.

Moreover, the study found no actions for issuing special regulations to determine the allowable level for water pollution according to different water usage, including industrial purposes. Article 24 requests for the Ministry (replaced by the EPI Board) to make such regulation.

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The administrative sanction as a legal tool for preventing pollution in Kurdistan under Article 42 is not effective for minimizing environmental pollution in Kurdistan. The amount of fine for offences under this law is too low compared to the damages caused.

The study also found that the penalties on administrative confiscation, deprivation of financial benefits, and legal prosecution against the responsible employees are absent under Law No. 8 (2008). The study noted that the absence of these legal technics and mechanisms contributed to further inefficiency of the law to control and prevent river pollution in the region.

(b) Law No.4 (2022) for Water Management and Protection (The New Water Law)

The study also found that, the new Water Law No. 4 (2022) does not comprehensively regulate river management independently under the authority of the Water Council of the region, since the law requires collaboration and coordination with other institutions, which may have poor coordination. Although the new water law led to the establishment of the Water Council in the Region (WCR) for the purpose of water management and protection as well as river protection, the executive power of the WCR to prevent and control river pollution is limited and not all related institutions are a member in the Council.

This new law also lacks the provision on administrative confiscation, financial benefits, and legal prosecution against the responsible employees. The absence of these provisions would lead to the poor role of the law in combatting river pollution in

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the region, because these legal technics and penalties are crucial to prevent environmental pollution including river pollution.[672]

The provisions on imprisonment, fine, and removal of waste or violation can be found in this New Water Law via Article 19 and Article 20 with stricter penalties. However, the duration of the imprisonment is too short, i.e., not more than three months (Article 19) applicable to all offences under this law. The provision on the responsibility of the offender to compensate the environmental damages while facing legal sanctions such imprisonment, fine, and removal of wastes are also not available in this new law.

The introduction of the Box for water Protection and Improvement under this law is very interesting. The main function of this Box is to provide financial funds for water resources protection, improvement, and pollution prevention (including river pollution) in the region (Articles 13 and 14). The Box is managed by an administrative council and regulated by the system issued by the council of ministries (Article 13). Although it is a positive provision, the study discovered that in Article 14, the Box has two sources of income namely from the region's annual budget and financial aid given to the Box. However, this provision does not include water-related fees, taxes, and fines gained by implementing this or other water-related laws as one of the incomes of the Box. Sustaining the function of this Box for the long term is doubtful since the operation is based on the total income of two resources.

The New Water law deprives some ministries of the right to vote, such as the Ministry of Planning, the Ministry of Electricity, the Ministry of Interior, and the Ministry of

[672] Refer to Chapter five.

Health. The water council also does not include representatives from relevant ministries and agencies in the region such as the Ministry of Trade and Industry and the Investment Board.

The introduction of the water utilization is categorized based on the priorities of different sectors such as drinking and services necessity, animals and fish purposes, irrigation and agricultural purposes, industrial necessity and energy generation, environmental purposes, and tourism sector and investment purposes, which gave a positive vibe to Kurdistan. Although this is a positive step, it requires the clarification of some words by instruction. For example, it is not clear what the services for drinking purposes entail.

6.2.4 Institutional Arrangement for River Protection

Governmental institutions in Kurdistan have not effectively managed their roles and responsibilities. Based on the current legal framework, river pollution control and prevention are under three responsible institutions:

(a) Environmental Protection and Improvement Board (EPIB);

(b) Water Council in the Region (WCR); and

(c) Other ministries involved indirectly based on their jurisdictions.

(a) Environmental Protection and Improvement Board (EPIB)

Based on Article 4 of Law No. 3 (2010) of the Environmental Protection and Improvement Board, the study concluded that the EPIB is not an independent body. The absence of an independent administration agency that enables the regulation of the water sector, the censorship of its usage, the issuance of water instructions, and the

enforcement of water-related laws present a significant barrier for water management particularly in controlling and preventing river pollution in the region by different sectors. The EPIB faces difficulties in the case of the Tanjero River due to lack of executive power to remove illegal activities and prevent water violation by existing surrounding projects.

Regarding the Environmental Impact Assessment (EIA) for projects established before the enactment of this law, Article 13 gives authority to the Minister of Environment who is replaced by the Head of the EPI Board, to ask any industry or institution that poses environmental effects to prepare the EIA for their activities, if it is necessary to preserve the environment. The study found that the provision can be criticized as it does not obligate the Minister to request the EIA from these projects.

Recently, the Board issued the new instruction No. 283 on March 16, 2021, regarding the preparation of an EIA report by private offices or companies. Although this is a good step for developing the quality of these reports, the study found that this instruction does not authorize the Board to have members or experts develop the report and monitor the process to ensure its sufficiency based on the legal requirements above and its implementation.

Based on the study's investigation and empirical data, it was found that the Board is not legally authorized with sufficient executive power to face environmental violations and prevent river pollution, in this case, the Tanjero River. Moreover, the study found some other barriers for the Board, such as shortcomings in human resources as well as in financial and technical support.

Even though the Board is mandated to raise public awareness about environmental preservation and coordinate with NGOs and volunteers to organize activities for educating people, the study found that environmental education is not prioritized by the Board and other governmental institutions including the Ministry of Education and the Ministry of Higher Education and Scientific Research.

(b) Water Council in the Region (WCR)

The Minister of the Ministry of Agriculture and Water Resources (MoAWR) is the head of the council. Almost all members of the council are from the MoAWR except for two who come from outside the ministry, namely the "Head of the Environmental Protection and Improvement Board" and the "General Manager of Water and Sewerage in the Ministry of Municipality and Tourism of the Region".

The New Water Law does not establish a comprehensive legal framework and mechanism to coordinate between ministries and the EPI Board with the Water Council. Only four ministries are allowed to send their representatives in the position of general manager to the council's meeting (i.e., the Ministry of Planning, the Ministry of Electricity, the Ministry of Interior, and the Ministry of Health), without having the right to vote.

Institutions with strong impacts on water resources do not exist in the newly created Water Council in the region (such as the Ministry of Industry and Trade and the Investment Board in Kurdistan Region of Iraq). Therefore, the Water Council is not an independent water agency based on a clear and sufficient legal framework. The study also expects repeated existing challenges regarding river pollution control, such

as poor coordination and overlapping responsibility, since a strong and adequate foundation for sustainable water management is not provided. The law also does not include all the relevant institutions within its structure to coordinate and cooperate in water management.[673]

(c) Involvement of Other Ministries

The study found the absence of an efficient and independent environmental ministry for preventing or minimizing pollution particularly river pollution in the region. The Environmental Protection and Improvement Board, is not provided with sufficient enforcement power, which in turn contributes to poor river protection. As previously noted, river protection is fragmented across different ministries, which may cause overlapping responsibilities and poor coordination.[674]

The study found that some other institutions and ministries are involved in the river pollution issues including the Ministry of Agriculture and Water Resources (MoAWR), Ministry of Industry and Trade (MoIT), Ministry of Natural Resources (MoNR), Ministry of Municipality and Tourism (MoMT), and Ministry of Health (MoH).

Based on Law No. 6 (2010) for the Ministry of Agriculture and Water Resources (MoAWR) and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq, the study found that the MoAWR is responsible for managing and preserving water resources including river because the Ministry has tasks and

[673] Refer to Chapter Three.
[674] Refer to Chapter Four.

responsibility to enhance agricultural and water resources in the region. Water is indeed essential for agriculture. About 70% of the world's freshwater usage goes to the agricultural sector; however, water shortage along with arable land degradation is expected to become a serious barrier to the effort of increasing food production to meet future demands.

However, the study discovered that the MoIT did not perform its provided roles and objectives based on Law No. 10 (2010) for the Ministry of Industry and Trade. The MoIT is not coordinated with the EPI Board to enforce all environmental requirements for the industries, which causes serious industrial pollution to the Tanjero River. Besides that, the MoNR also have a legal responsibility to control environmental pollution including river pollution in oil and gas sectors, as the study found oil pollution also occurs in the Tanjero River and other rivers due to the poor enforcement of environmental rules and standards by the MoNR. Mining activities mainly quarry factories also cause river pollution, changing the river's direction and causing deforestation and biodiversity loss. The MoNR also does not properly enforce Iraqi Law No. 91 (1988) for Regulating Mineral Investment. Simultaneously, some other laws are violated by mineral activities, particularly quarry factories, including Law No. 10 (2012) for Forest in Kurdistan Region of Iraq.

Law No. 3 (2010) of the Environmental Protection and Improvement Board does not provide legal authority to the Board to be an administrative agency for sewerage and drainage systems. However, it is clear based on Law No. 12 (2010), that the MoMT manages the public sewerage systems in Kurdistan; ambiguousness arises in terms of the private sewer systems. The law does not explicitly highlight the obligation of the

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private sector, or illustrate whether the Ministry is responsible for private sewerage systems. Furthermore, the law does not differentiate between private and public sewerage systems.

Based on Law No. 12 (2010), it could be understood that the MoMT has duties for all the sewer sectors, whether public or private, including its establishment, maintenance, alteration and abolishment. Moreover, the Ministry has a specific department of sewerage system called the General Directorate of Water and Sewage. This issue must be addressed because various private institutions discharge their water waste into public sewer systems and contribute significantly to river pollution, since most do not have any pre-treatment plants. Moreover, some of the private industries are not even connected to the public sewerage system.

The New Water Law also requires all new projects to build their own waste treatment plant before starting operations. However, it does not clearly mention if the private sector should reuse their treated water or connect it to the public sewerage system to transport their treated water, which is not preferable because public sewerage wastes in the region are not treated yet.[675]

6.2.5 Enforcement

Based on the study findings, legal and illegal projects nearby the Tanjero River have caused river pollution and environmental catastrophes. This is mainly due to the poor enforcement of environmental-related laws in the area, which in turn is the outcome of the EPI Board's lack of power as well as poor cooperation and coordination among

[675] Refer to Chapter Four and Five.

other relevant agencies such as the MoTI, MOMT, MoNR, MoH, and MoAWR with the EPI Board to prevent river pollution in the region.

The study found that the weakness of governmental agencies in enforcing the environmental laws (legal techniques and administrative penalties) was due to the absence of a clear and comprehensive legal framework, administrative routing, poor coordination, corruption, and political power. With regards to the problem of medical waste, the study found some challenges including the employment of traditional medical waste management and poor enforcement of environmental rules by the relevant authorities, particularly the MoH and the Municipality.

The management of the agricultural sector is under the jurisdiction of the MoAWR based on Law No. 6 (2010) for the Ministry of Agriculture and Water Resources in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq. The study noted that the MoAWR has not enforced the provided authority and objectives under this law. Therefore, the Tanjero River also suffers from agricultural wastes such as pesticides and other chemicals.

In terms of the role of the Water Council (WCR), which is mainly directed by the MoAWR based on Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq, the study expects some challenges due to the incomprehensive framework for water resources management under the new water law. However, it is still too soon to evaluate or examine the empirical aspect of the new water law since it only came into enforcement on September 6, 2022.[676]

[676] Refer to Chapter Five.

Even though petroleum projects are causing environmental pollution in the region at an alarming rate, specific environmental regulations have not been issued for the purpose of oil pollution prevention. Meanwhile, Law No. 22 (2007) for Oil and Gas in Kurdistan Region of Iraq authorizes the MoNR to issue specific environmental regulations for oil and gas projects in the region. For instance, Paragraph 1 of Article 37 under Kurdistan's Production Sharing Contracts (PSC) mentions the protection of the environment by international oil companies. However, this provision is not put into practice.

Regarding the sufficiency and effectiveness of the enforcement mechanisms to prevent river pollution, the study noted that the enforcement mechanisms play a significant role in preventing the pollution of rivers and other water resources. Existing environmental laws such as Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq include some legal techniques and enforcement mechanisms to control water pollution including river pollution.

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(a) Legal techniques to prevent river pollution

The study found that the region's environment of Law No. 8 (2008) for Environmental Protection and Improvement of Kurdistan Region of Iraq includes legal techniques to prevent or minimize environmental pollution, including "Prohibition, Obligation, Licensing, Reporting and Enticement".[677] However, the enforcement of these techniques is not rigorous enough to prevent or minimize pollution in the Tanjero River. The prohibition of waste discharges into rivers, seas and regional waters is

[677] Refer to Chapter Five.

assertively mentioned in the environmental law, but these rules are not enforced properly.

Many industries and human activities without a legal license in Kurdistan discharge their wastes, particularly wastewater, into the Tanjero River. The New Water Law provides no provisions to control these illegal industries. Existing legal projects that discharge their wastes into water resources are given six months from the date of the law's implementation to build a waste treatment plant; otherwise, they are considered to be in violation of the rules of this law (Paragraph 5, Article 11).

In addition, the environmental law and the New Water Law obligate the owners of industrial and business projects to get rid of their waste by using environmentally-friendly technology. The law and regulations further obligate industrial owners to treat, store, and deal with the wastes based on specific standards and measures. Industries are also obligated to reuse and recycle their wastes, if possible, in a scientific manner. Unfortunately, according to the study findings, there is a weakness in the region as most industries discharge their wastes into the rivers in non-environmentally sound manner or without any pre-treatment.

Furthermore, the study noted poor awareness among people about water protection. In this regard, Paragraph 4 Article 3 of Law No. 8 (2008) for EPI obligates NGOs as well as public and private institutions involved in research, learning, education, media, and regional matters to share about environmental awareness in the region. Despite such obligations, the study noted that these institutions still do not take proper steps to organize environmental awareness programs due to the lack of enforcement and poor

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coordination between the Board and other institutions, such as the Ministry of Education and the Ministry of Higher Education and Scientific Research. However, the new water law does not clearly mention the obligation of NGOs, educational institutions or the media in developing awareness about water resources protection and improvement. It only mentions the duty of the MoAWR in coordinating with other governmental and non-governmental institutions and the media to raise awareness about the importance of water for living and incorporating this in the education system (Paragraph 4, Article 6).

Based on Article 20, the Kurdistan legislature adopts financial and non-financial advantages to combat pollution such as financial assistance, credit, tax exemption or legal facilitates, economic insurance, and so on. As the study found, the existing legislations still does not sufficiently include all types of financial and non-financial motivations whilst the current practice of such mechanisms to encourage industries to develop their infrastructure in an environmentally-sound manner is still poorly enforced in the region. This is attributed to inadequate legal provisions within Law No. 8 (2008) for EPI and Law No. 4 (2022), the absence of specific instructions by the EPI Board and the Ministry of Finance and Economy as mentioned in Article 20, poor coordination, and the lack of enforcement in this regard.

(b) Administrative penalties to prevent river pollution

In terms of law enforcement, the study found that Article 10 of Law No. 8 (2008) for EPI had led to the establishment of the Environmental Protection and Improvement Box with the objective of spending the amount of fines collected for environmental

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protection and development purposes. However, this Article is still not properly enforced as the Board has limited powers to collect and spend the received income for environmental purposes. Moreover, the study found that the current situation with the environmental fee collection is in violation of Law No. 8 (2008). This is because the Board does not receive all the environmental fees paid to the KRG for environmental purposes.

The New Water Law No.4 (2022) only includes fines as a financial penalty while non-financial penalties such as imprisonment, removal of wastes (or violation), and withdrawal of license are imposed on projects that do not establish their own waste treatment plant within six months from the date of the law's application (Paragraph 5, Articles 11, 19 and 20). Besides that, the law allows for other stricter penalties to be imposed based on any enforceable laws in the region.

Current water-related legislations such as Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region of Iraq and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq do not adequately provide these administrative tools necessary for preventing river pollution. The study found some barriers such as poor coordination among government institutions and lack of enforcement of these available tools.

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6.3 Recommendations

Based on the study findings, the study recommendations are as follows:

6.3.1 Kurdistan's legal framework for river protection

Since the existing legal framework for river protection in the Kurdistan is not adequate, thus it requires a realistic reform based on the current trend of sustainable water resources management and global climate change. Therefore, the existing legal lacunae should be further developed. Apart from that, institutional development is also necessary to efficiently manage rivers in a sustainable manner. The study points out some useful recommendations in this regard.

(a) Recognizing the right to access clean water for everyone under Iraqi constitution

In order to fully enjoy other human rights, the federal and regional governments have the responsibility to constitutionally protect the right to a safe environment and the right to health. It is also crucial to clearly recognize the right to access clean water for everyone as a human right under the Iraqi constitution, as shown in Table 6.1 below.

Table 6. 1

Recommendations on the right to access clean water

Legislation	Original Provision	The Proposal
Iraqi constitution	**No provision** exists about the recognition of the right to access clean water.	**To insert a new provision** on the right to access clean water, as follows:

	"Everyone has the right to access sufficient, safe and affordable water."

Source: Researchers findings

(b) Revision of legal provision for river protection: Law No. 8 (2008) and Law No. 4 (2022)

The study recommends to develop the main environmental legislation (Law No. 8 (2008) and Law No. 4 (2022). Therefore, the study highlights some issues to be addressed by policymakers.

(i) Legal amendments for better river preservation

The study recommends some legal developments to provide adequate protection for water resources, particularly rivers, as shown in Table 6.2 below.

Table 6. 2

Recommendations for legal amendment

Legislation	Original provision	The Proposal
Law No. 8 (2008)	**Article 2 (3)** "Maintaining and developing the natural resources, and rationing their utilization."	To insert: "Maintaining and developing the natural resources, and rationing their utilization *through the adoption of the concept of sustainability*."
	Article 2 (4) "Fourth: Making the environmental policy a part of	To insert: "Making the environmental policy a part of the general

	the general planning of the development in all respects (humanity, industrial, agricultural, urban, tourism fields and others)."	planning of the development in all sectors such as industrial, agricultural, urban, municipality tourism fields, health, education, and others."
	Article 12 **No provision** about the role of the Environmental Board in monitoring and evaluating the quality of the EIA study.	**To insert a new provision on EIA**, as follows: "*The Environmental Board, through coordination with other institutions, evaluates the quality of the EIA study*."
	Article 13 "The Minister can request from a moral or normal person, or from any agency, performing an activity affecting the environment, before the execution of this law, to prepare a study for the environmental impact assessment of their projects if they have requirements for protecting the environment."	**To replace the word "can" with "must"**, as follows: "The Minister *must* request from a moral or normal person, or from any agency, performing an activity affecting the environment, before execution of this law, to prepare a study for the environmental impact assessment of their projects if they have requirements for protecting the environment."

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	Article 20 "The Ministry in coordination with the Ministry of finance prepares a system of incentives to aid moral or normal persons who encompass activities or offer ideas which protect or improve the environment."	It is recommended to: Enforce Article 20 by issuing specific regulations based on the coordination between the Environmental Board and the Ministry of Finance and Economics.
	Article 22 "The exertion and discharging of any harmful substances, liquid, gaseous, radioactive or thermal into water sources or their sewers are prohibited if they are not treated according to *usual standards.*"	**To add the words** "wastes" and "scientific standards required by the Board, the Ministry of Agriculture and Water Resources or other institutions." The Article may read as follows: "The exertion and discharging of any *wastes* or harmful substances, liquid, gaseous, radioactive or thermal into water resources, or their streams are prohibited if they are not treated according to *scientific standards required by the Board, the Ministry of Agriculture and*

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		Water Resources or other institutions."
	Article 23 "Determination of regional standards for surface, ground, and drinking water will be set by regulation."	It is recommended to have a detailed list of these standards, and issue the regulation in this regard by the Board through coordination with other relevant institutions.
	Article 24 "The Ministry determines the measurement for the permissible pollution level in water used for drinking, irrigation, industrial, and service purposes, and returning to this measurement when needed."	To insert: "The Board determines the measurement for the permissible pollution level in water used for drinking, irrigation, industrial, and service purposes, and returning to this measurement when needed." It is also suggested to issue water regulations to clarify the abovementioned measurements in detail. Thus, the study suggests developing different regulations to define water measurements of the pollution level for different usages such as drinking,

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		irrigation and industrial purposes.
Law No. 4 (2022)	**No provision** about the recognition to the right to access clean water for everyone.	**To insert a new provision**, as follows: "Everyone has the right to access sufficient, safe and affordable water."
	No provision about financial and non-financial promotion for water protection.	**To insert a new provision**, as follows: "The Water Council, in coordination with the Ministry of Finance and Economic, develop a regulation for providing financial and non-finical promotion to encourage water preservation and sustainable management (for instance, financial assistance such as credit and tax exemption, or non-financial such as legal support, economic insurance and so on).
	Article 4 (1) The Kurdistan region's government in coordination with the federal government	**To insert the word "internal"** for Article 4 (1), as follows: "The Kurdistan region's government, in coordination

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	participate in: “First: Water policy making”. This provision is general and includes internal and external water policies.	with the federal government, participates in: “First: Internal water policy making”. **Justification:** Based on Article 114 (7) of the Iraqi constitution, internal water resources will be managed based on the coordination between the FGI and the KRG.
	Article 4 (2) “Developing water resources utilization policy with neighboring countries based on international water conventions and water customary law.”	**It is recommended to remove Article 4 (2).** **Justification:** This provision violates the Iraqi constitution (Article 110, Para 8), which only authorizes the Iraqi federal government to manage international rivers flowing from the neighboring countries as a matter of state sovereignty.
	Article 5 (1), (2) Law No. 4 (2022) comes with provisions that define water	**It is recommended to issue a regulation**: **Justification:** Article 20 of Law No. 4 (2022) authorizes the

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	resources and their utilization based on six different sectors. **Still no regulation exists** based on the new water law to regulate the water license and utilization of all types of water resources for different sectors.	Minister of Agriculture to issue a regulation. It is necessary to develop such regulations for water utilization, including groundwater, for different human usage purposes, such as industrial, agricultural and investment projects. It is also advised in the proposed regulation to clarify which of the water utilization purposes needs a license prior, or which of them is considered right to be used, or which of them should determine the amount of utilization, or which of the water resources should explain the purpose of their usage and so on (for example, Singapore regulates the type and amount of water that can be used based on different purposes such as cooking, bathing, toilet, washing clothes, machinery and so on.)

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		There is also a need to develop coordination among the relevant agencies particularly between the MoAWR, the Ministry of Industry and Trade, and the Investment Board. To do so, IWRM and IRBM should be taken into consideration for better institutional reform for river protection.
	Article 7 (1) Based on this provision, some institutions do not take part as members of the Water Council (WCR) such as the Ministry of Industry and Trade (MoIT), and the Investment Board (IB).	**It is recommended to add the MoTI and the IB to the WCR as members**, by amending Article 7 (1).
	Article 11(1) "Water utilization must be according to the global water quality standards."	**To insert these standards clearly**, as follows: "Water utilization must be according to the global water quality standards from the World Health Organization or any other verified standards."

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	Article 11(3) "Any project that has wastes, till the enforcement of instructions of relevant ministries, are not allowed to be established."	To amend as follows, "Any project that has wastes, till the enforcement of instructions of relevant ministries and the Environmental Protection and Improvement Board, are not allowed to be established."
Law No. 6 (2010) for the Ministry of Agriculture and Water Resources	Law No.6 (2010) **is not sufficient** and requires reforms and improvements, so as to be suitable with the jurisdiction provided to the MoAWR based on the new Water Law No. 4 (2022).	It is recommended to: **Revise Law No. 6 (2010) to have a modern and comprehensive agricultural law** for the region in order to enhance its irrigation system, prevent water wastage and water pollution, and improve the agricultural sector in a sustainable manner to rationalize water utilization for agricultural purposes by taking into account the roles given to the ministry by the new Water Law No. 4 (2022).

Source: Researcher's findings

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(ii) Developing medical waste management to prevent river pollution

To shift medical waste management from the traditional approach to a more modern and sustainable one to prevent environmental pollution including river, some legal revisions are required, as presented in Table 6.3.

Table 6. 3

Recommendations for better medical waste management

Legislations	**Original Provision**	**The Proposal**
Law No. 8 (2008)	**No specific provision** about medical waste management. Only general and ambiguous provisions exist in Article 3(6), which states that: "Healthcare institutions, measurement devices and quality control must consider the environmental health principles in their working programs."	**To insert a new provision** on medical waste management, as follows: "First: Every public and private medical institution such as hospitals and laboratories, must do the following: A - Establish their own medical waste treatment system to ensure that their wastes will not be dumped, landfilled or managed in non-scientific and traditional ways. B - Increase the recycling of non-infected medical

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		plastics (such as medical plastic packages and IV solution bags) on top of proper source separation. C - Health institutions are obligated to minimize wastes by reusing them, and modernize their medical waste recycling system. Second: The Board and the Ministry of Health must coordinate safe medical waste management. Third: New regulation should be issued within six months from the date of enacting this law to clarify the proper mechanisms and techniques for medical waste management."
Law No. 15 (2007) Ministry of Health	**Article 2(5)** "Coordination with the Ministry of Environment for environmental protection and	**To replace the word** "Ministry" to "Board", as follows:

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	improvement, and preventing environmental pollution."	"Coordination with the environmental board in the following aspects: 1 - Raising awareness about health hazards associated with environmental pollution. 2 - Preventing medical waste pollution. 3 - Developing medical waste management by adopting scientific means to prevent environmental pollution due to health sector activities. For example, upgrading technical, financial and humanitarian support for safe medical waste management in the region's health sector."
Law No. 4 (2022)	**Article 7 (1)** "A council in the MoAWR will be established named the	**To include the "MoH" in the list of the water council's membership**, read as follows:

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	Water Council in the Region, which is headed by the minister and members of the following agencies...” Based on this provision, the Ministry of Health is not included as a member of the new Water Council in the region.	“Article 7 (1): The council in the ministry “MoAWR” will be established named” Water Council in the Region”, which will be headed by the minister and membership of the following agencies: 7- Ministry of Health.”
	Article 7 (2) “The representatives of the following agencies, with the position of at least a General Manager will participate in the WCR’s meeting without having the right to vote: 1 - The Ministry of Planning 2 - The Ministry of Electricity 3 - The Ministry of Interior	**To add the representative of the MoIT and IB in the Water Council**, read as follows: “Article 7(2): The representatives of the following agencies, with the position of at least a General Manager, will participate in the WCR’s meeting without having the right to vote: 1 - The Ministry of Planning 2 - The Ministry of Electricity 3 - The Ministry of Interior

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	4 - The Ministry of Health."	4 - The Ministry of Industry and Trade 5 – The Investment Board."

Sources: Researcher's finding

(iii)Legal amendment for stricter penalties: Environmental Law No. 8(2008) and the new Water Law No. 4 (2022) to prevent river pollution

Since the cost of environmental pollution is huge and has long-term negative consequences, the study recommends developing stricter penalties and enforcing them equally without any exemption. The study particularly recommends the following, as illustrated in Table 6.4.

Table 6. 4

Recommendations for strengthening penalties for river pollution

Legislation	Original Provision	The Proposal
Law No. 8 (2008)	**No provision** about some administrative penalties.	**To introduce new penalties**, as follows: - Deprivation of financial benefits - Administrative confiscation penalty - Legal prosecution against responsible employees.
	Article 42 (1)	To increase the punishments, which reads as follows:

	Inadequate punishments, which states: "Without prejudice of any severe punishment forenamed in other laws, the dissenting of the rules of this law, regulations and instructions issued according to it is punishable by **imprisonment** for a *period not less than one month or by a **fine** not less than 150,000 (one hundred and fifty thousand) dinars and not to exceed 200,000,000 (two hundred million) dinars or by both punishments."*	*"Without prejudice of any severe punishment forenamed in other laws, the dissenting of the rules of this law, regulations and instructions issued according to it is punishable by imprisonment for a period not less than six months or by a fine not less than 300,000 (three hundred thousand) dinars and not to exceed 400,000,000 (four hundred million) dinars or by both punishments.* Although this provision has been amended based on the Article 1, Law No.11 (2022) Law for the First Amendment of Law No.8(2008) of the Environmental Protection and Improvement in Kurdistan Region-Iraq, the penalty remains the same. Thus, it is recommended to amended it as stated above.

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Law No. 4 (2022)	**Article 20 (1)** **Existing punishments not impactful, as stated:** "Anyone who breaks the rules of Article 9 faces **imprisonment** for a period of not less than *six months* and a **fine** not lower than *7 million* dinars and not over 10 million dinars, and should remove the violation and return the materials or wastes to their previous places."	To increase the punishments, as follows: "Anyone who breaks the rules of Article 9 faces imprisonment for a period not less than *twelve months* and a fine not lower than *15 million* dinars and not *over 20 million* dinars, and should remove the violation and return the materials or wastes to their previous places."
	Article 20 (2) **The existing punishments are not sufficient and do not include maximum imprisonment**, which states: "In the case of repetitive violations, the first paragraph of Article 20 states a punishment of: **Imprisonment**: not less than **one year** with a fine not lower than *10 million* dinars and not above *15 million* dinars, on top of the	To increase the punishment and highlight the maximum period of imprisonment, as follows: "In the case of repetitive violations, the first paragraph of Article 20 states a punishment of: Imprisonment: not less than two years and not more than five years with a fine not lower than *20 million* dinars and not above *30 million* dinars, on top of the

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	removal of the violation by the offender."	removal of the violation by the offender."
		It is recommended to: Strike a balance between the dangerousness of the environmental violation with the strengths of the punishment, by developing different types of penalties based on the water pollution level.

Source: Researcher's finding

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6.3.2 Institutional development to control river pollution

The study recommends to improve the institutional arrangement for better river protection and controlling river pollution. The study recommend as follows,

(a) Develop the Environmental Protection and Improvement Board's jurisdiction

The Environmental Board, as the main environmental institution in the region, is facing difficulties in protecting the environment, particularly in preventing river pollution. Further developments in its jurisdiction may boost its roles in this regard. The study suggests some actions as highlighted in Table 6.5, as follows:

Table 6. 5

Recommendations for expanding the Board's jurisdiction

Legislation	Original provision	The Proposal
Law No. 3 (2010)	**Article 4** "The board performs the following tasks for achieving its goals: First: Suggesting the general policy for environmental protection. Second: Establishing annual, medium- and long-term planning. Third: Issuing special instructions. Fourth: Performing surveys and tests related to environmental pollutants and the factors."	It is recommended to: **Enhance the Board's jurisdiction**, as follows: - Develop the jurisdiction of the Environmental Board to provide more authority as well as technical and financial support. - Provide enforcement power to prevent environmental pollution or minimize it. - Establish environmental policy force under the authority of the Board's Head. - Human resources development to boost the Board's performance.
	Article 5 (2) **"**The person nominated to the position of the Head of the Board, should: C. Have at least a university degree with skills and experiences in his/her expertise."	**To insert the words** "Master's degree" and "at least 10 years' experience", which read as: **"**The person nominated to the position of the Head of the Board, should: C. Have a

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		Master's degree with good skills and experiences of at least *10 years* in his/her expertise."
	Article 7 "First: The board has a council with the presidency of the chairman of the board and consists of: 1 - Representatives from the following ministries with a degree of no less than a General Director…" This provision lists fourteen ministries but does not include the Investment Board when in fact the investment sector is strongly related to the environment.	**To include the Investment Board** in the Board's council, as follows: "First: The board has a council with the presidency of the chairman of the board and consists of 1- Representatives from the following ministries with a degree of no less than a General Director ... O- Investment Board…"
	Data management: **No Provision.** Lack of accurate and sufficient data about water and environmental issues.	**To introduce a new provision** on the data management system for the Board, as follows: 1. "The board coordinates with other institutions to develop a systematic and transparent data management of environmental issues.

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		2. Everyone has the right to access the data."
	Annual report Currently, based on Paragraph 3/Article 7 of the Law No. 3 (2010), the annual report of the Board should be sent to the Council of Ministries before being published.	The study suggests removing this provision and giving full freedom to the EPI Board to publish its annual report or any other announcement about the environment in the region without obligating the Board to send it to the Council of Ministries before publishing or any other restrictions.

Source: Researcher's findings

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(b) Development of other laws and institutions: Revision of Law No. 91 (1988) for the Regulation of Mineral Investment

Some industries should be prevented from committing river degradation. The study recommends developing the legal protection of rivers from the harm of quarry activities through the improvement of the provisions in Law No. 91 (1988) for the Regulation of the Mineral Investment, since the current version of the law does not include sufficient provisions that clearly prevent river damage by mineral activities, particularly quarry projects. Thus, some legal changes may be taken to ensure better river protection against these activities, as presented in Table 6.6.

Table 6. 6

Recommendations to revise Law No. 91 (1988)

Legislation	Original provision	The Proposal
Law No. 91 (1988)	**No provision** Although Article 3 mentions preserving environmental elements like forests, dams, and agricultural lands, there is no explicit provision for the protection of rivers from the impacts of mineral activities.	**To add new provisions** on water resources protection against the impacts of mineral activities, as follows: "1. All mineral activities under the rules of this law *must protect water resources* from any negative impacts. 2. Mineral activities such as quarrying *must* be done far away from rivers, at least by 1000 meter, and all measures to prevent the negative impacts on water river quality and quantity must be taken. 3. The Ministry of Natural Resources and the Board will issue the instruction for regulating the water protection measures for quarrying and other mineral activities."

Source: Researcher's findings

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(c) Developing Industrial and Municipal Waste Management: Amendment of Law No. 10 (2010), Law No. 12 (2010) and Law No. 4 (2022):

To minimize the impacts of the industrial and municipal sectors on water resources, it is crucial to revise the contents of some relevant legislations, including Law No. 10 (2010) for the Ministry of Trade and Industry, Law No. 12 (2010) for the Ministry of Municipality and Tourism, and Law No. 4 (2022) in Kurdistan Region of Iraq. Some proposed suggestions are highlighted in Table 6.7 below

Table 6. 7

Revising Law No. 10 (2010), Law No. 12 (2010), and Law No. 4 (2022) for better waste management and water resources preservation

Legislations	Original Provisions	The proposal
Law No. 10 (2010) for the Ministry of Trade and Industry	**No provision** about sustainable development in the industrial sector.	**To insert new provisions** under Article 2 or the new Article titled "Environmental protection", which include the following: "1-Every industry with environmental impacts must develop sustainable management for materials and wastes. 2 - Every industry with environmental effects must establish waste treatment plants. 3 – Every industry must follow all the environmental requirements and

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		standards that come under other enforceable laws for industry.”
Law No. 12 (2010) of the Ministry of Municipality and Tourism	Article 2 (1) MoMT is responsible for managing sewer infrastructure (including construction, development, and maintenance)	**To add a new provision** on sewerage waste management, as follows: “1 - Develop sustainable sewer infrastructure as part of the city’s master plan. 2 -The Ministry of Municipality and Tourism should coordinate with the MoAWR and other relevant institutions to develop sustainable sewerage waste management and avoid water resources pollution.”
	No provision about private sewer system. Law No. 12 (2010) does not mention about private sewer systems for trade and industry effluent.	**To insert new provision** on private sewer system, as follows: “All private industries and activities that produce wastewater must establish their own sewer system and treat the wastewater before discharging it into the public sewer.” The study recommends taking lessons from other countries in developing a legal framework for sewer management, such as Singapore, which has a special law for sewerage

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		and drainage system based on the Sewerage and Drainage Act (10) of 1999.
Law No.7(2022) for the Ministry of Municipality and Tourism in Kurdistan Region-Iraq		Recently, Law No. 12 (2010) was abolished by the new law which is Law No.7(2022) for the Ministry of Municipality and Tourism in Kurdistan Region-Iraq. Despite issuing the new law, these issues are not considered, thus, the study suggests to reconsider these recommendations as pointed out above for the previous law.
Law No. 4 (2022) for Water Management and Protection	Article 1(9) Treated wastewater is considered a water resource and falls under the management of the MoAWR and WCR.	To insert: "1 - The WCR should coordinate with the Ministry of Municipality to develop sustainable sewerage management. 2 - The WCR must establish a wastewater treatment plant for public sewerage wastes before discharging them into the environment, including

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	rivers, in coordination with other institutions. 3 - The Ministry of Municipality and Tourism may coordinate with the WRC to issue new regulations and policies for safe sewerage waste management."

Source: Researcher's findings

(d) Collaborate to develop legal bases for better waste management

The study recommends policymakers in the region to take lessons from other countries' experience. However, it is significant to develop a collaboration with international communities and organizations to achieve sustainable management of waste. Some countries adopt strategic planning to manage wastes in an environmentally-friendly way. For instance, the study explained the Circular Economy package, which has been adopted by the European Commission as a very ambitious strategy that caused some legal frameworks on waste management to be reformed such as the EU's Seventh Environment Action Programme. This programme has the significant objective to manage municipal solid waste (MSW) and achieve a recycling rate of 65% by 2030 and to decrease landfilled waste to no more than 10%. Therefore, it is critical to take lessons and experiences from other countries to get an update of the latest waste management model to shift from traditional waste management to sustainable waste management, which would ultimately be sufficient to shape a legal framework.

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6.3.3 Enforcement mechanisms to prevent river pollution

In terms of the enforcement of existing legal techniques and mechanisms to prevent river pollution in the Kurdistan region, including the Tanjero River, the study recommends collaboration and some steps to solve the problem of poor coordination and law enforcement by relevant ministries based on their jurisdictions as discussed earlier in the study, as follows.

(a) Stricter enforcement of law is urgently necessary to prevent river pollution

Based on the study findings, lack of enforcement of environmental laws and regulations is considered the main barrier to preserving the environment, including rivers. Therefore, the study recommends that the executive authority, including the relevant ministries and institutions, enforce Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan and the newly issued water Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq. The study particularly highlights some points to be implemented by the government to control river pollution in the region, such as:

(i) Environmental education

Table 6. 8

Recommendations for enhancing environmental education

Legislations	Original Provision	The proposal
Law No. 8 (2008)	**Article 2 (5) Raising environmental awareness**.	It is recommended to: - **Enforce the existing provisions** under Law No. 8 (2008) and Law No.4 (2022) about public environmental

	Article 3 (3) **Incorporating environmental education** into the national education and learning system.	awareness to raise awareness and educate people to respect the environment, including rivers. - **Develop collaboration and coordination** between the private and public sectors, NGOs, media, schools, universities and other institutions in doing regular awareness campaigns.
Law No. 4 (2022)	**Article 6 (4)** **Raising public awareness about the water resources** and take this into consideration by educational sector.	

Source: Researcher's findings

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(ii) Improving Self-monitoring report: Revising of Article 17 of Law No. 8 (2008)

The study recommends an amendment to Article 17 of Law No. 8 (2008) for EPI regarding the submission of self-monitoring reporting to the Board because the Board plays the main role in monitoring projects to ensure their compliance with the environmental requirements, as explained in Table 6. 9 below.

Table 6. 2

Recommendations to amend Article 17 of Law No. 8 (2008)

Legislations	Original provisions	The proposal
Law No. 8 (2008)	**Article 17** "The owner of any project or establishment must encompass the	**To replace and add some words**, as follows:

	processes of self-monitoring in coordination with related agencies according to the measurements and controls put by the *Ministry*, and send the reports about it according to the *Ministry'*s instructions or any other agencies as determined by the regulations and instructions issued according to this law."	"The owner of any project or establishment must encompass the processes of self-monitoring in coordination with related agencies according to the measurements and controls put by the *Board*, and send the reports about it to the *Board according to Board's instructions, which will be issued according to this law*." - Issue new and clear regulations about the report's requirements, and the timing for submitting such reports. - Effective enforcement of the provisions under this law and regulations in this regard.

Source: Researcher's findings

(iii) Environmental fees

The EPI Board and the WCR should be financially supported. It is necessary to return all environmental fees to the Board and Water Council to be spent for environmental and water resources protection and improvement purposes based on Instruction No.

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(2) of (2009) Environmental Protection and Improvement Fund in Kurdistan Region-Iraq as clarified below in Table 6.10.

Table 6. 3

Recommendations for returning environmental fees to the Board and WCR

Legislation	Original provision	The Proposal
Instructions No. (2) of (2009) Environmental Protection and Improvement Fund in Kurdistan Region-Iraq.	**Article 6 Incomes of the fund**: "The fund's income consists of the following sources: Allocated funds from the Kurdistan Regional Government (Paragraph 1), the Iraqi Federal Government (2), and fees and environmental penalties received according to valid legislations (5)."	It is recommended to **enforce Article 6** by taking these actions: - Providing financial support to the EPI fund by the KRG and IFG, through a special budget. - Collection of all money under the name of "environmental fees" obtained by other ministries such as the Ministry of Finance and the Ministry of Interior, by the Board for the EPI fund.
Law No. 4 (2022)	**Article 13 (1)** "A box will be established called the Water Resources Protection and Improvement	It is recommended to: - **Enforce** this provision ASAP to provide financial support for sustainable

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	Box in the Region (WRPI Box)".	water management and reduce river pollution through the WRPI Box.
	Article 14 (3) "The Council of Ministries will issue the instruction to regulate how the box's income should be spent."	It is recommended to: **Enforce this provision** by the Council of Ministries and issue the instruction for clarifying the mechanisms and details about spending and using such income for water preservation and improvement purposes.
	No provision in Article 14 (1) about the allocation of water-related fees, taxes and other revenues such as fines or other financial penalty.	**To insert new provision** to collect water-related income, as follows: Article 14 (3): "Returning all water-related revenue such as fees, taxes and fines to the box to be spent for water resources protection and development purposes."

Source: Researcher's findings

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(iv) Upgrading the role of the Environmental and Forest Protection Police (EFPP) and Security Forces (SF) in controlling river pollution: amendment of Law No. 4 (2022)

In accordance with Article 15 of the new Water Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq, the EFPP from the Ministry of Interior (MoI) and SF from the Kurdistan Region Security Council (KRSC) are authorized to protect water resources in the region. These forces should be supported to effectively tackle any environmental and water violations. Some suggestions are shown in Table 6.11 below.

Table 6. 4

Recommendations for revising Article 15 of Law No. 4 (2022)

Legislation	**Original provision**	**The proposal**
Law No. 4 (2022)	**Article 15** "The Security Agency and Environmental and Forest Protection Police are in charge of preserving water resources."	**To enforce this Article** effectively, some recommended actions are necessary, as follows: - Give the responsibility of water resources protection to one force rather than two forces from two different agencies. - Provide legal privileges for these forces, including financial and technical support. - Develop coordination among governmental institutions (such

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	as the Ministry of Agriculture and Water Resources, the Ministry of Interior, and the Kurdistan Region Security Council) to support these forces in managing their tasks.

Source: Researcher's findings

(v) Other ministries responsibility towards river pollution prevention

According to the study findings, it appears that other ministries have their own legal responsibilities that should be respected regarding river management. As the study discussed, other ministries are authorized by their jurisdiction to prevent pollution, including river pollution. Therefore, the study suggests that these ministries perform their respective environmental tasks, particularly in preventing river pollution more effectively. Based on their jurisdiction, each of them may prevent or minimize the Tanjero River pollution by prioritizing river protection through efficient coordination and rigorous enforcement of environmental rules against violators. The most crucial actions and collaborations are pointed out in Table 6.12 below.

Table 6. 5

Recommendations for better ministerial collaboration

Government Institutions	**Suggested Actions**
Ministry of Agriculture and Water Resources (MoAWR)	- Develop sustainable water management. - Establish water treatment, reuse, reduce, and modernize irrigation systems, preventing illegal water utilization etc.

Ministry of Natural Resources (MoNR)	- Prevent environmental degradation and water pollution by oil and gas operations. - Issue environmental regulations for oil and gas sectors in coordination with the Board. - Authorize the Environmental Board to monitor oil and gas activities to prevent or minimize pollution. - Prevent illegal oil activities, including in the Tanjero River area.
Ministry of Trade and Industry (MoTI)	- Promote sustainable development of the industrial sector. - Enforce environmental standards on industrial activities, stricter monitoring mechanisms, waste treatment, recycling, and development of clean energy. - Prohibit illegal industries. - Relocate existing industrial areas near the water resources, particularly industrial activities nearby the Tanjero River. Good understanding and coordination is required with other institutions such as the MoMT, MoAWR, MoFE, MoP and IB to do so. - Provide legal and financial privileges for sustainable or green industries.
Ministry of Municipality and Tourism (MoMT)	- Establish sustainable waste management. - Develop sewer, drainage and water network infrastructure.

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	- Prevent water loss and illegal water connection to the public network. - Provide sufficient clean water for everyone. - Separate wastes from the sources. - Remove landfilling nearby water resources such as the Tanjero River area. - Promote recycling and reusing of wastes.
Ministry of Health (MoH)	- Develop medical waste management. - Develop clear regulations for medical waste management. - Support health institutions in utilizing modern technology for managing generated wastes in a safe way. - Coordinate with the Board, the WCR and other agencies to raise awareness about environmental and water pollution threats and risks.
Ministry of Finance and Economic (MoFE)	- Provide a special budget for environmental preservation and improvement, including for water. - Return all fees, taxes and other incomes to the Board or Water Council. - Develop regulations in coordination with the Board and the WCR to promote environmental and water protection and improvement. - Provide financial support to any ministerial initiative for preserving the environment, including water.

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Ministry of Education (MoE)	- Incorporate environmental education into the curriculum. - Establish campaigns and activities about water and environmental protection.
Ministry of Higher Education and Scientific Research (MoHESR)	- Expand environmental and water education. - Support environmental protection, including water, through conferences, campaigns, and researches etc.
Ministry of Planning (MoP)	- Develop a national plan for water. - Coordinate with other institutions, particularly the Board and the WCR.
Investment Board (IB)	- Support green investment. - Invest in water sustainability. - Coordinate with the Board and the WCR in preserving surface and underground water resources from investment activities. For example, obligating new residential areas and cities to have wastewater treatment, 25% green area etc.

Sources: Researcher's findings

(vi) Rigorous enforcement of new water Law No. 4 (2022)

It is necessary to prohibit all activities that cause river damage. To do so, Article 9 (among others) should be enforced strictly as soon as possible. Particularly in the case of the Tanjero River, some human activities cause river pollution, such as the washing of cars in the river, and the discharge of various medical wastes, pollutants, animals, and construction wastes by private sectors or individuals nearby the river.

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It is also crucial to take legal action against illegal activities. The study recommends removing all illegal activities, such as industrial, agricultural, and oil activities, that cause river pollution. This is a critical mechanism if enforced precisely and rigorously. The Tanjero River area is swamped with many illegal or legal projects that do not fully comply with environmental requirements. Therefore, effective enforcement of environmental standards is highly necessary upon licensed industries. The Ministry of Interior (MoI), the EPI Board, the MoTI, and the MoAWR should give a certain period for the illegal projects to remove their activities until they obtain a legal license; otherwise, the municipality must remove all illegal industries or the MoI under the expense of the offender.

(b) Activate the role of the Kurdistan Parliament for better law enforcement

The study believes that the Kurdistan parliament should perform an effective role in this era of climate change. The parliament may perform a significant role in different ways, including developing water-related legislations, monitoring the enforcement of water-related laws and regulations by the government, and taking legal actions on any ministries or private sectors violating environmental law. This is because water is a precious national resource and is recognized as public property by the new water law. Thus, relevant parliament committees must take serious action in this regard (such as environmental and health committees, industrial and agriculture committees, and water resources committees). These committees should effectively monitor the impacts of the industries on rivers and responds to the government through field monitoring and reporting of any violation in order to take parliamentary action on river protection. In the case of the Tanjero River, this concern by the Parliament does not yet exist.

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6.4 Conclusion

Water resource protection is essential to continue life on the planet. River is the only and very limited source of fresh drinking water for humans and animals. The problem of river pollution is increasing at an alarming rate in Iraq, including the Kurdistan region. At the same time, climate change impacts are also causing unprecedented water stresses, such as repeated droughts and growing desertification. The Tanjero River, among others, is seriously polluted due to different anthropogenic factors originating from Sulaymaniyah city, including various industrial, municipal, sewerage, medical, and agricultural wastes. Thus, it is significant to tackle the legal implications of river preservation as a crucial surface water resource for humans, animals, and the whole ecosystem.

The region suffers from unsustainable river management. The existing legal framework in the Kurdistan region does not provide comprehensive protection for rivers. Law No. 8 (2008) for Environmental Protection and Improvement in Kurdistan Region and Law No. 4 (2022) for Water Management and Protection in Kurdistan Region of Iraq are not adequate enough to control different factors of river pollution caused by different sectors. Theoretically, the study attempted to evaluate the new water Law No. 4 (2022) for Water Management and Protection by showing its advantages and shortcomings. However, it still needs to be tested empirically by other future studies. Apart from that, the enforcement mechanisms including the new water law and the environmental Law No. 8 (2008) are not effective and adequate enough in preventing river pollution, including the Tanjero River, due to the insufficiency and ambiguousness of some legal provisions, poor institutional arrangement including

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fragmentation of river protection management, poor coordination, and political interference.

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APPENDICES

Appendix 1: **Interview Protocol**

PART 1: Demographic Information

Name	Gender	Age	Higher academic qualification	Occupation	Position	Email	Interview Code
							Filled up by Researcher

PART 2: Interview Questions

This section comprises the interview questions based on the research objectives and questions:

Section A: Legal frameworks for protecting rivers from pollution - RO1

Assessment of the adequacy of the environmental laws in the KRI - RO2

1. Are the rivers in Kurdistan-Iraq polluted? How serious is it? Which river is the most polluted? 2. What are the causes of river pollution?
3. What are the main laws/regulations/policies to curb river pollution in Kurdistan-Iraq?
4. Is Environmental Law No.8 (2008) adequate enough to protect the environment in general?
5. What are the shortcomings of the current Law No.8 (2008) in the case of preventing pollution at the Tanjero River?

6. Are monitoring (such as licensing, reporting, EIA and others), administrative penalties (financial and non-financial) and other mechanisms such as encouragement sufficient enough under Law No.8 (2008) in prohibiting contamination at the Tanjero River?

Section B: The enforcement mechanisms in the Kurdistan Region to prevent the problem of pollution at the Tanjero River - RO3

1. Which environmental institution is responsible for protecting water resources/rivers in Kurdistan-Iraq? How does the institution react to this issue? Does the Iraqi central government tackle the problem of curbing river pollution? Why?
2. What is the main government agency involved in protecting rivers in the Kurdistan Region Government? What are their functions? Does the agency respond to the laws/regulations/policies? Why?
3. What are the roles of the environmental agency in the KRG in protecting Tanjero River? 4. Is the Kurdistan parliament involved directly in monitoring the situation? What are the roles of NGOs and the local people? How do they respond to this issue?

Section C: How can the legal framework for protecting rivers in Kurdistan be improved - RO4

1. How can we enhance the legal framework in terms of institutions and laws to preserve rivers? What are the best specific points that can be improved to protect rivers?

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2. Do you think the Kurdistan Region needs to issue a specific law protecting water resources or rivers? Why? Is there any country that has an independent water law? And institution?
3. To what extent does the lack of coordination and overlapping responsibility exist in the current legal framework? Administratively, is it better to have an independent water institution with sufficient legal support such as the Public Utility Board (PUB) in Singapore? Why?
4. Do you have any other suggestions to solve the problem of river pollution?

Signature ……Date of Interview……../ / 2021

Thank you..

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Appendix 2: **Information Consent Form**

Dear participant,

My name is HIWA RASHID ALI, a PhD candidate at University Utara Malaysia (UUM). The title of my research is "**LEGAL ANALYSIS OF RIVER POLLUTION CONTROL AND PREVENTION IN KURDISTAN IRAQ"**

Research Description: The study is a legal research on river pollution that focuses on the Tanjero River. River pollution is a very crucial issue in Kurdistan, which impacts the environment and society significantly.

The general objective of the research is to analyze the current legal framework for the purpose of river protection in Kurdistan. The specific objectives of this research are:

1. To study the existing legal framework and protection against river pollution in Kurdistan?
2. To examine the institutional framework to overcome the issue of river pollution in Kurdistan?
3. To analyze the enforcement mechanism for the protection against river pollution in Kurdistan?
4. To recommend improvements to the existing legal framework for the control and prevention of the river's pollution in Kurdistan.

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You are invited to participate in this research, which will require approximately around 45 minutes of your time. This interview is completely on voluntary basis. There is no compensation for participating in this research. However, your participation will be a valuable addition to my research and the findings could lead to greater public understanding of river pollution. During this time, you will be interviewed about your opinions, experiences, perceptions and views on the topic of the research.

The interview data will be sent via e-mail in order to be transcribed later for the purpose of analysis. The interview material will be stored securely for a period of two years; after that, it will be destroyed. Each interviewee will be assigned a number code to help ensure that personal identifiers are not revealed during the analysis and write-

up of findings. The data from the interviews will be kept in a locked and safe file with a password.

Due to the COVID-19 pandemic, the interviews will be conducted via online and subject to the participants' convenience.

If you have any further inquiries, please do not hesitate to contact the researcher at the following contact information: hiwa.rashid@garmian.edu.krd or

Mobile No: 0770 654 53 84.

Thank you for your participation, time and efforts.

Name of Expert ……

Scientific Title……..

Place of Job……..

Current Position …….....

CONTACT INFORMATION

Frequently Used E-Mail……

Official E-Mail (if any)…….

Phone No. ……....

Signature of the interviewee ----------, Date----------

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RESEARCHER INFORMATION

PhD Candidate (HIWA RASHID ALI)

College of Law, Government and International Studies (COLGIS), Universiti Utara Malaysia, 06010 Sintok, Kedah Malaysia

Place of Job: Garmian University- Kurdistan Region - Iraq.

Phone No: 0770 654 53 84.

E-Mail: hiwa.rashid@garmian.edu.krd

Appendix 3: **Interview Questions Assessment Report**

To/ University Utara Malaysia (UUM)

College of Law, Government and International Studies (COLGIS)/School of Law

"Interview Questions Assessment Report"

Greetings,

I would like to inform you that I have evaluated the semi-structured interview questions for the PhD student (**Hiwa Rasheed Ali**). I believe his questions are suitable based on his study objectives and questions. Therefore, he can move forward with the data collection process.

Please let us know if you have any inquires or concerns.

Best regards…

Professor. Dr. Sangar Dawood Mohammed

Study Staff in College of Law/Salahaddin University

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Appendix 4: **Images of Tanjero River site**

Image 1: Researcher's field work (July 22, 2020)

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Image 2: Researcher's field work (April 8, 2021)

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Image 3: Water samples

Left bottle: Polluted water from the Tanjero River

Right bottle: Clean water

Date: April 8, 2021

Photo by: Researcher

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Image 4: Public protesting against the Tanjero River pollution.

Date: November 11, 2019

Photo: Ranj Atta

Poster*: "27 years failure to solve the problem of Tanjero River pollution. Tanjero River is waiting…"*

Image 5: Animal body in the Tanjero River area.

Date: April 8, 2021

Photo by: Researcher