Tanjaro River Threat Assessment & Action Plan (TAAP) Report

JUNE 2022
SUMMARY

Tanjaro River is located in Sulaymaniyah governorate North-East of Iraq stretching for 120kms to merge with Sirwan river and feed into Darbandikhan lake, this river has 245 imminent threats identified to locate inside its basin or next to it, making it undrinkable, non-swimmable and unfishable. The threats were identified during a 2 months survey covering the entire stretch of the river from its source to its merging point with Sirwan river. The survey was conducted by two field workers using car, boat and drone to capture the threats the river is facing all along the river stretch and used a criterion adapted from BirdLife International (2006) for assessing threats to areas of conservation concern. Data collection and analysis provided a clear view on the river’s situation that led to the creation of action plans that are of high importance and immediately required implementations. The action plans focus on solving these problems that are arranged into 12 categories, out of these 12, climate change with pollution and energy production and mining are three of the most severe, large and existing threats that need most focus and solving in a strategic way ranging from elimination of municipal sewage, wastewater and garbage pollution that enter the water resources directly, restoration of riparian and in-stream habitats and functions that were damaged by gravel mining and other energy production and mining threats, well assessed country-level climate adaptation needs, collecting needed Climate Data/information and outreach projects to combat climate change consequences.

KEY WORDS

Tanjaro River, Iraq, Threats, Pollution, Climate Change, Gravel mines, Data, action plan.
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1. INTRODUCTION

The Tanjero River Threat Assessment took place from April to June of 2022 as part of Tanjaro River Threat Assessment Survey and Outreach Project and was funded by European Union (EU) - United Nations Development Program (UNDP). It consisted of surveys of the Tanjero River to identify and evaluate all threats to the river based on criteria identified by the International Union for the Conservation of Nature (IUCN). This project was conducted in cooperation with Humat Dijlah Organization and the Kurdistan Environmental Protection and Improvement Board (Environment Directory of Sulaimaniah) and is one of the first effort of its kind in Iraq that visited the entire basin using such comprehensive surveys.

In addition to the assessment of the threats to the basin presented in this report, a targeted action plan has been developed to effectively address each threat and is presented here. The strategic objectives and action steps outlined in this plan will guide future efforts of Waterkeepers Iraq and other government and non-governmental groups in efforts to protect the rivers and waterways of Kurdistan, northern Iraq.

2. STUDY AREA

The Tanjero River has its origins in North-West of Sulaimaniah with its source coming from the Piramagroon Mountain, the main streams feeding Tanjero river start with Chaq Chaq stream which is a seasonal stream that later merges with Sarchinar stream and then Qiliyas stream, all flowing down to form Tanjero River in South-West of Sulaimaniah. Tanjero River stretches for 70Km to merge with Zalim Stream and 30Km later merging with Sirwan River which comes from Iran. The Sirwan-Tanjero junction creates the Artificial Darbandikhan lake and later meet Darbandikhan dam. The entire river stretch from Chaq Chaq Stream to Darbandikhan Dam is 130km. The dam is located in South East of Sulaimaniah, the purpose of the dam is irrigation, flood control, hydroelectric power production and recreation. Due to poor construction and neglect, the dam and its 249 MW power station have undergone several repairs over the years. A rehabilitation of the power station began in 2007 and was completed in 2013.

Darbandikhan lake is also providing drinking water and water for irrigations for communities living downstream in Garman Area with a capacity to hold 3,000,000,000 m³ of water, however in recent years due to the dams and tunnels built to direct and cut Sirwan river and it’s tributaries by the Iranian government and drought the water levels have drastically decreased to the point of complete dry-out of the lake.

After Darbandikhan Dam the river is called Sirwan river because Tanjero is a tributary for it and it flows down to Diyalah and finally feeds into Tigris River below Baghdad. The following figures (F.1.a, F.1.b, F.1.c, F.1.d and F.1.e) are a satellite image and drone shots of Tanjero River:
Fig.1.a, A satellite picture of the Tanjero River stretching 120 kilometres from North-West to South-East of Sulaimaniah city.
Tanjero River Threat Assessment Survey and Outreach Project

Fig.1.b, Drone shot of Tanjero river in upstream of the river near the source south of Hanarani Sarw Village.

Fig.1.c, Drone Shot of Tanjero river flowing down from 2 gravel mines
Tanjero River Threat Assessment Survey and Outreach Project

Fig. 1.d, Drone Shot of Tanjero river merging with Zalm Stream and later with Sirwan river to form Darbandikhan Lake.

Fig. 1.e, Drone Shot of Tanjero river passing by Unca Sun Oil Facility and a Gravel Mine before reaching Tanjaro Area.
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3. METHODOLOGY

3.1 THREAT ASSESSMENT

Waterkeepers Iraq Organization conducted a threat assessment starting in April 2022 and completing in June 2022; the primary work was in late spring. The goal of the threat assessment was to identify threats to river habitats (in-stream and riparian habitats) and services (fisheries, water quality, flows and river function) utilizing a Pressure-State-Response (PSR). This method is an adaptation of a method outlined by BirdLife International (2006) for assessing threats to areas of conservation concern. The PSR Model relies on three types of indicators: Pressure, State & Response.

The threat assessment method primarily addressed here is focused on pressure indicators, such as the identification and tracking of threats to an area from pollution, urban development and other issues. State indicators (measurements or attributes that refer to the condition of the site) and Response indicators (conservation actions being taken at a site) are presently beyond the scope of this project.

Pressure Indicators consist of the following eleven threat types, as defined by the IUCN in BirdLife International (2006):

1. **Agricultural expansion & intensification**: Threats from farming and ranching as a result of agricultural expansion and intensification, including silviculture, mariculture and aquaculture. Note that wood and pulp plantations include afforestation, and livestock farming and ranching includes forest grazing. Agricultural pest control and agricultural pollution-specific problems apply to ‘5. Overexploitation, persecution & control’ and ‘9. Pollution’, respectively.

Note: In this project, it was often difficult to determine the level of “expansion” and/or “intensification” occurring along the river, which would have required some understanding of previous baseline information of the area used for agriculture. Thus, the present assessment merely provides information on the current agricultural activity along the river.

2. **Residential & commercial development**: Threats from human settlements or other non-agricultural land uses with a substantial footprint, resulting in habitat destruction and degradation. Note that domestic or industrial pollution-specific problems apply to ‘9. Pollution’.

3. **Energy production & mining**: Threats from production of non-biological resources, resulting in habitat destruction and degradation.

4. **Transportation & service corridors**: Threats from long, narrow transport corridors and the vehicles that use them, resulting in habitat destruction, degradation, and disturbance.

5. **Over-exploitation, persecution & control**: Threats from consumptive use of wild biological resources including both deliberate and unintentional harvesting effects; also persecution or control of specific species.

6. **Human intrusions & disturbance**: Threats from human activities that alter, destroy and disturb habitats and species associated with non-consumptive uses of biological resources.

7. **Natural system modifications**: Threats from actions that convert or degrade habitat in service of managing natural or semi-natural systems, often to improve human welfare. Note
that ‘other ecosystem modifications’ includes intensification of forest management, abandonment of managed lands, reduction of land management, and under grazing. ‘Dams & water management/use’ includes construction and impact of dykes/dams/barrages, filling in of wetlands, groundwater abstraction, drainage, dredging and canalization.

8. Invasive & other problematic species & genes: Threats from non-native and native plants, animals, pathogens and other microbes, or genetic materials that have or are predicted to have harmful effects on biodiversity (through mortality of species or alteration of habitats) following their introduction, spread and/or increase in abundance. We were not able to assess these threats due to lack of information.

9. Pollution: Threats from introduction of exotic and/or excess materials from point and non-point sources causing mortality of species and/or alteration of habitats. Note that domestic and urban waste water includes sewage and run-off; industrial and military effluents includes oils spills and seepage from mining; agricultural and forestry effluents and practices includes nutrient loads, soil erosion, sedimentation, high fertiliser input, excessive use of chemicals and salinization; and air-borne pollutants includes acid rain.

10. Geological events: Threats from catastrophic geological events that have the potential to cause severe damage to habitats and species. We were not able to assess these threats due to lack of information but in most cases the main geological threats facing Iraq are earthquakes.

11. Climate change & severe weather: Threats from long-term climatic changes which may be linked to global warming and other severe climatic/weather events. We were not able to assess these threats due to lack of information but global warming, desertification and increased dust storm events are potentially significant threats in Iraq.

12. Other: Car washing spots, threats in locations were individuals take their cars and wash it inside the riverbed or next to the river which results in disturbance of the river habitat and polluting the river with cleaning materials.
3.2 Rating each threat

Each threat class was rated based on its Timing, Scope and Severity. Scoring for each was based on a 0-3 scale as defined below.

**Instructions for threats scoring:**

### Timing of selected threats

<table>
<thead>
<tr>
<th>Timing of selected threats</th>
<th>Timing Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happening now</td>
<td>3</td>
</tr>
<tr>
<td>Likely in short term (within 4 years)</td>
<td>2</td>
</tr>
<tr>
<td>Likely in long term (beyond 4 years)</td>
<td>1</td>
</tr>
<tr>
<td>Past (and unlikely to return) and no longer limiting or No Threat</td>
<td>0</td>
</tr>
<tr>
<td>Not evaluated</td>
<td>blank</td>
</tr>
</tbody>
</table>

### Scope of selected threats

<table>
<thead>
<tr>
<th>Scope of selected threats</th>
<th>Scope Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole area/population (&gt;90%)</td>
<td>3</td>
</tr>
<tr>
<td>Most of area/population (50-90%)</td>
<td>2</td>
</tr>
<tr>
<td>Some of area/few individuals (10% - 49%)</td>
<td>1</td>
</tr>
<tr>
<td>Small area/few individuals (&lt;10%) or No Threat</td>
<td>0</td>
</tr>
<tr>
<td>Not evaluated</td>
<td>blank</td>
</tr>
</tbody>
</table>

### Severity of selected threat

<table>
<thead>
<tr>
<th>Severity of selected threat</th>
<th>Severity Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rapid deterioration (&gt;30% over 10 years or 3 generations, whichever is longer)</td>
<td>3</td>
</tr>
<tr>
<td>Moderate deterioration (10-30% over 10 years or 3 generations)</td>
<td>2</td>
</tr>
<tr>
<td>Slow deterioration (1-10% over 10 years or 3 generations)</td>
<td>1</td>
</tr>
<tr>
<td>No or imperceptible deterioration (&lt;1% over 10 years) or No Threat</td>
<td>0</td>
</tr>
<tr>
<td>Not evaluated</td>
<td>blank</td>
</tr>
</tbody>
</table>

The Timing, Scope and Severity Scores were then added to provide an integrated threat assessment score between 0-9.

**Impact Score = Timing Score + Scope Score + Severity Score**

Note that if the Timing, Scope, or Severity Score was 0, the Impact Score was automatically listed as 0.

The Impact Score would then be used to classify the particular threat into its final Threat Status Score (which was color-coded) as a Low, Medium, High threat based on the following scale:

<table>
<thead>
<tr>
<th>Impact Score =</th>
<th>Threat Status Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 3</td>
<td>1 Low</td>
</tr>
<tr>
<td>More than 3 to 6</td>
<td>2 Medium</td>
</tr>
<tr>
<td>More than 6 to 9</td>
<td>3 High</td>
</tr>
</tbody>
</table>
3.3 Survey Team
The survey team was made up of the Iraq Upper Tigris Waterkeeper and a field assistant, which included either a member of the Sulaimani Environment Directorate, an additional Humat Dijlah staff and/or a volunteer.

3.4 Record Keeping
A Waterkeepers Iraq Basic Site Information sheet was filled out for all sites that included basic information on the site (i.e. date of visit, logistical information, GPS start and end locations and elevations, and hand drawn maps of the site). Photos were taken throughout the survey and the threat assessment was filled based on notes taken in the field at the end of each survey day. Once the Waterkeeper returned to the office, the data was entered into an excel sheet of all the threats of the rivers for it to be analyzed later.

4. Data & Discussion

4.1 THREATS

The main threats on Tanjero River by sector are as follows:
Tanjero River Threat Assessment Survey and Outreach Project

Scoring of Tanjero River Threats was as follows:

**Table 1: Threat Types, Average and Highest Scores & Number of Threats**

<table>
<thead>
<tr>
<th>Threat Types</th>
<th>Average Impact Score</th>
<th>Highest Impact Score</th>
<th>Total # of Threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Agriculture</td>
<td>5.9</td>
<td>6</td>
<td>55</td>
</tr>
<tr>
<td>2. Residential &amp; commercial development</td>
<td>7</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>3. Energy production &amp; mining</td>
<td>8.1</td>
<td>9</td>
<td>45</td>
</tr>
<tr>
<td>4. Transportation &amp; service corridors</td>
<td>5</td>
<td>5</td>
<td>16</td>
</tr>
<tr>
<td>5. Over-exploitation, persecution &amp; control of species</td>
<td>5.5</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>6. Human intrusions &amp; disturbance</td>
<td>Not Assessed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Natural system modifications</td>
<td>6.4</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>8. Invasive &amp; other problematic species and genes</td>
<td>Not Assessed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Pollution</td>
<td>8.3</td>
<td>9</td>
<td>112</td>
</tr>
<tr>
<td>10. Geological events</td>
<td>Not Assessed</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11. Climate change and severe weather</td>
<td>9</td>
<td>9</td>
<td>1</td>
</tr>
<tr>
<td>12. Other</td>
<td>6</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td><strong>Total # of Threats</strong></td>
<td></td>
<td></td>
<td>245</td>
</tr>
</tbody>
</table>

Threat types represent general threats to the river. It is important to understand the specific threats that were seen. The following table provides a list of the most common specific threats seen in the survey and the number of GPS-located specific threats for each type (See Annex 1).

<table>
<thead>
<tr>
<th>Threat Category by most damage on the river</th>
<th>Specific Threats</th>
<th>Number of GPS located threats</th>
</tr>
</thead>
<tbody>
<tr>
<td>11. Climate change and severe weather</td>
<td>Drought</td>
<td>Drought is occurring throughout the river stretch, changing the river from permanently having water to a seasonal river.</td>
</tr>
<tr>
<td>9. Pollution</td>
<td>Sulaimaniah City dumpster sites, Leachate from waste oil of oil refineries making its way into the river, Industrial waste from the city dumped next and/or into the river, Sewage boxes and Sewage Pipes with no treatment plants</td>
<td>35 Industrial Waste, 3 Leachate, 26 Sewage Box, 32 Sewage Pipe, 18 dump sites and 2 very large city dumps</td>
</tr>
<tr>
<td>3. Energy production &amp; mining</td>
<td>Gravel Mining, Quarries and Oil Refineries dumping waste in the river</td>
<td>30 Gravel Mine, 6 oil refineries,</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>2. Residential &amp; commercial development</th>
<th>Development of Residential Areas on the river and in agriculture lands</th>
<th>1 threat</th>
</tr>
</thead>
<tbody>
<tr>
<td>7. Natural system modifications</td>
<td>Dams, pumping water from the river for use in irrigation, diverting the flow of the river to use the water for gravel mines.</td>
<td>2 failed dams, 5 pumping station, 1 river modification</td>
</tr>
<tr>
<td>12. Other</td>
<td>Car washing locations which have cars disturbing the river bed and polluting the water.</td>
<td>2 car washing locations</td>
</tr>
<tr>
<td>1. Agriculture</td>
<td>Agriculture farms using water from the river for irrigation and use fertilizers that end up in the river after heavy rains, Animals farms next to the river that have cattle and sheep grazing around the river.</td>
<td>39 agriculture farms, 15 animal farms</td>
</tr>
<tr>
<td>5. Over-exploitation, persecution &amp; control of species</td>
<td>Illegal fishing during fish spawning season</td>
<td>2 illegal fishing</td>
</tr>
<tr>
<td>4. Transportation &amp; service corridors</td>
<td>River crossings; tertiary dirt roads for gravel mines; areas used by car, and development of 100m Road around Sulaimaniah that crosses the Tanjero River</td>
<td>3 big bridges, and 11 smaller ones.</td>
</tr>
</tbody>
</table>

4.2 Threat Maps
A series of MAPS have been prepared from the data that provide more comprehensive information on where the highest threats are occurring along the Tanjero River for each threat category.
Note that in the maps the threats are colour coded. For areas that have no placemarks that means no specific threat was identified.
In fig 3, Agricultural land is indicated within a light green polygon based on the satellite images.

4.3 Concluding Remarks & Recommendations
The Threat Maps are not meant to make definitive, final statements regarding the threats affecting the the Tanjero River Basin. No attempt was made to assess or monitor actual water quality. Based on our knowledge, currently there is no other regular, water quality monitoring effort within the Tanjero River Basin or other natural, surface waters of the region. Regular and on-going water quality monitoring of lakes, rivers, springs and other natural surface waters and the free sharing of water quality information with the public is highly needed in the region.
Additional work remains to be done and this survey effort is a preliminary assessment to define areas where future work should be concentrated and hot spots were conservation actions would best be focused. An action plan follows the Threat Maps, which detail a series of specific objectives, strategies and action steps that we recommend to pursue in addressing many of the threats seen in the basin.
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Fig. 2, Tanjero River with all Threats Map (245 threats)
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Fig. 3.a, Tanjero River with Agriculture Expansion & Intensification Map (55 threats)

Fig. 3.b, Example of Agriculture Expansion & Intensification threat on Tanjero River
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Fig. 4.a, Tanjero River with Residential & Commercial Development threats (3 threats)

Fig.4.b Example of Residential & Commercial Development threat on Tanjero River
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Fig. 5.a, Tanjero River with Energy Production and Mining Threats (45 threats)

Fig. 5.b, Example of Energy Production and Mining threat on Tanjero River
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Fig. 6.a, Tanjero River with Transportation and Service Corridors (16 threats)

Fig. 6.b, Example of Transportation and Service Corridors threat on Tanjero River
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Fig. 7.a, Tanjero River with Over-exploitation, persecution & control of species (2 threats)

Fig. 7.b, Example of Over-exploitation, persecution & control of species threat on Tanjero River
Fig. 8.a, Tanjero River with Natural system modifications (9 Threats)

Fig. 8.b, Example of Natural system modifications threat on Tanjero River
Tanjero River Threat Assessment Survey and Outreach Project

Fig. 9.a, Tanjero River with Pollution Threats (112 threats)

Fig. 9.b, Example of Pollution threat on Tanjero River
Fig. 10.a, Tanjero River with Climate Change & Severe Weather threats (1 threats)
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Fig. 10.b, Satellite image of Climate Change & Severe Weather threat on Tanjero River 31/12/1992 for comparison.

Fig. 10.c, Satellite image of Climate Change & Severe Weather threat on Tanjero River 31/12/2020 for comparison.
Tanjero River Threat Assessment Survey and Outreach Project

Fig. 11, Tanjero River with Other threats (2 threats)

Fig. 11.b, Example of Other threat on Tanjero River (Car washing spot).
5. ACTION PLAN

Based on an assessment of the threats observed on the Tanjero River, a series of Objectives, Strategies and Action Steps have been identified. Each objective will require concrete strategic actions and specific action steps to achieve the objective(s). Nine specific threats are targeted here and were selected because they were considered high priority threats (threats with the highest overall threat scores) but were also threats that we believe the Waterkeepers Iraq Organization could make a positive impact in the short to medium term. These are presented to encourage discussion and focus future work of the Waterkeepers Iraq Organization and its partner governmental institutions and non-governmental organizations. The following strategic actions and action steps have been identified for Strategic Objective 1.1 to address municipal sewage and wastewater issues:

<table>
<thead>
<tr>
<th>Threat 9. Pollution: Municipal Sewage and wastewater</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Objectives</strong></td>
<td><strong>By 2026, local communities and government stakeholders are informed of threats from municipal sewage and wastewater problems</strong></td>
</tr>
<tr>
<td><strong>Objective 1.1</strong></td>
<td><strong>Promote Citizen Science/Education methodology</strong></td>
</tr>
<tr>
<td><strong>Strategic action 1.1.1</strong></td>
<td><strong>Run at least 72 Water Quality monitoring trips per year, with a minimum of 25 different stakeholder groups involved in these trips.</strong></td>
</tr>
<tr>
<td><strong>Action Step #1</strong></td>
<td><strong>Develop at least 4 similar actions/activities per year to increase community involvement and awareness.</strong></td>
</tr>
<tr>
<td><strong>Action Step #2</strong></td>
<td><strong>Release the annual scorecard at a public press conference and event to build pressure to promote better wastewater handling.</strong></td>
</tr>
<tr>
<td><strong>Action Step #3</strong></td>
<td><strong>Promote better understanding of the sources of these problems.</strong></td>
</tr>
<tr>
<td><strong>Strategic action 1.1.2</strong></td>
<td><strong>Document, photograph, GPS locate and map all key sources of municipal sewage and wastewater to local waterways.</strong></td>
</tr>
<tr>
<td><strong>Action Step #1</strong></td>
<td><strong>Publish a report on major municipal pollution inputs to local waterways in four sample areas (e.g. Sulaimaniyah, Tanjero, Arbat, Said Sadiq, and Darbandikhan) that list recommendations for solutions and present to the Kurdistan Environment Board/Ministry of Environment and other government stakeholders and release publicly in a press conference. These four areas will serve as a model for other areas.</strong></td>
</tr>
<tr>
<td><strong>Action Step #2</strong></td>
<td><strong>Publish and promote information (brochure, information booth, presentations) on waste handling options and alternatives.</strong></td>
</tr>
<tr>
<td><strong>Action Step #3</strong></td>
<td><strong>Implement small scale pilot projects to address municipal sewage and garbage issues.</strong></td>
</tr>
</tbody>
</table>

**Objective 1.2**

By 2028, eliminate municipal sewage, wastewater and garbage pollution from entering untreated into local waterways from major towns and cities in Sulaimani and other areas.
### Tanjero River Threat Assessment Survey and Outreach Project

<table>
<thead>
<tr>
<th>Action Step #1</th>
<th>Develop a pilot project wastewater garden/constructed wetland to demonstrate small scale methods to address sewage pollution.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action Step #2</td>
<td>Develop demonstration programs for local residents about how to decrease water use and handle waste water issues generated in the home.</td>
</tr>
</tbody>
</table>

The following strategic actions and action steps have been identified for Strategic Objectives 2.1 and 2.2 to address garbage dumping at the municipal level and from commercial businesses as well as large scale illegal dumping:

#### Threat 9. Pollution: Municipal garbage dumps / Garbage and other pollutants from small business and “illegal dumping”

<table>
<thead>
<tr>
<th>Objectives</th>
<th>By 2026, problems and issues around garbage dumping clear to stakeholders and alternatives are being considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 2.1</td>
<td>Strategic Action 2.1.1 Develop an awareness and outreach program to municipalities and local businesses</td>
</tr>
<tr>
<td>Action Step #1</td>
<td>Develop a brochure about proper waste handling</td>
</tr>
<tr>
<td>Action Step #2</td>
<td>Work with KEPIB to develop guidelines for municipalities</td>
</tr>
<tr>
<td>Action Step #3</td>
<td>Work with municipality of Suliamani and others to develop incentive programs for businesses</td>
</tr>
<tr>
<td>Action Step #4</td>
<td>Implement an Award program for the &quot;Worst Polluters/Garbage Dumpers&quot; ... with specific categories such as &quot;worst polluting restaurant&quot;, etc (or do a top 10 list) and publically present these awards.</td>
</tr>
<tr>
<td>Action Step #5</td>
<td>Create a media campaign that focuses on the top &quot;garbage dumpers&quot; with newspapers, local TV and other media outlets</td>
</tr>
<tr>
<td>Strategic Action 2.1.2</td>
<td>Encourage the recycling of various waste streams (i.e. plastics/nonbiodegradable, food and organic wastes/biodegradable) in collaboration with local municipalities</td>
</tr>
<tr>
<td>Action Step #1</td>
<td>Work with the municipality of Suliamani and other towns to develop recycling pilot projects</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 2.2</th>
<th>By 2029, garbage dumping along rivers and in natural areas has stopped.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Action 2.2.1</td>
<td>Better rules and enforcement in place to control both legal and illegal dumping</td>
</tr>
<tr>
<td>Action Step #1</td>
<td>Research existing rules, regulation and enforcement patterns that govern garbage dumping at the municipal level and for small businesses (eg. restaurants, etc.)</td>
</tr>
<tr>
<td>Action Step #2</td>
<td>Work with KEPIB to develop guidelines for municipalities</td>
</tr>
<tr>
<td>Action Step #3</td>
<td>Work with the KEPIB and municipal stakeholders to implement pilot programs for waste handling</td>
</tr>
<tr>
<td>Action Step #4</td>
<td>Consider legal action against &quot;Worse Polluters/Garbage Dumpers&quot;</td>
</tr>
</tbody>
</table>
## The following strategic actions and action steps have been identified for Strategic Objective 3.1, 3.2, & 3.3 to address one of the highest threats seen on the Tanjero River: Gravel mining.

### Threat 3. Resource Extraction & Mining: Riparian & In-stream Gravel Mining

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Strategic action 3.1.1</th>
<th>Strategic action 3.1.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Objective 3.1</td>
<td>Collect and publish information on in-stream gravel mining for key stakeholders</td>
<td>Implement a Gravel Mine Awareness Program targeting local people, decision-makers &amp; the industry itself</td>
</tr>
<tr>
<td>Action Step #1</td>
<td>Collect information and research all aspects of in-stream gravel mining (Who runs the gravel mining operations; How is gravel mined; Where does it occur; Who provides the land and permissions for such operations; What are the profit margins involved; How does it affect the land; how many operations are legal vs illegal; and what licenses, rules and regulations govern such operations?). Note: Three to four specific areas should be selected to compare and contrast the situation in different localities.</td>
<td>Make a documentary about how people, villagers and farmers and the land itself are affected from gravel mining.</td>
</tr>
<tr>
<td>Action Step #2</td>
<td>Obtain old photographs of areas before gravel mining operations occurred to compare with photos taken after operations were conducted.</td>
<td>Show the documentary to the governors responsible for each area and talk to the government and municipality of Sulaimani, Hawler, and Kirkuk. It is important to show them the map, documents, film and all the adverse effects on the area.</td>
</tr>
<tr>
<td>Action Step #3</td>
<td>Refine objectives, strategic actions and action steps accordingly, update the action plan; translate and publish in a white paper on gravel mining</td>
<td>Take the media to areas around Tanjero river, where 30 gravel mines are working and as a result an enormous area has been affected.</td>
</tr>
</tbody>
</table>

### Objective 3.2

By 2027, gravel mining operations are licensed and in compliance with environmental rules

<table>
<thead>
<tr>
<th>Strategic action 3.2.1</th>
<th>Action Step #1</th>
<th>Action Step #2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pursue steps to encourage stronger regulations and compliance within the mining sector regarding riparian and in-stream gravel mining</td>
<td>Document the permitting and licensing process (who is responsible for giving gravel mines licenses and how are they obtained?)</td>
<td>Document and map the number and location of legal and illegal operations and identify</td>
</tr>
</tbody>
</table>
## Tanjero River Threat Assessment Survey and Outreach Project

<table>
<thead>
<tr>
<th>Action Step #3</th>
<th>Develop and advocate for recommendations for improvement to the licensing and compliance process.</th>
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### Objective 3.3
By 2030, riparian and in-stream habitats and functions have been restored.

<table>
<thead>
<tr>
<th>Strategic action 3.3.1</th>
<th>Develop &amp; Implement a restoration plan with local and government stakeholders to repair damage to riparian and in-stream habitats caused by previous gravel mining operations.</th>
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<tr>
<th>Action Step #1</th>
<th>Designate an area for a pilot restoration program that demonstrates a number of alternative restoration techniques.</th>
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</table>

<table>
<thead>
<tr>
<th>Action Step #2</th>
<th>Document restoration techniques and conduct training and capacity building programs for government agencies, gravel mining operation owners/staff and restoration professionals.</th>
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The following strategic actions and action steps have been identified for Objectives 4.1, 4.2 and 4.3 to address industrial wastes:

### Threat 9. Pollution: Municipal Sewage and wastewater

<table>
<thead>
<tr>
<th>Objectives</th>
<th>Threat 9. Pollution: Industrial Wastes (Tar factories, oil refineries, and cement block) factories</th>
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<tbody>
<tr>
<td>Objective 4.1</td>
<td>By 2025, increase local community and government awareness about the pollution caused by these facilities</td>
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<table>
<thead>
<tr>
<th>Strategic Action 4.1.1</th>
<th>See Strategic Action 1.1.1</th>
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<tr>
<th>Objective 4.2</th>
<th>By 2027, industrial facilities informed of laws and regulations, and limits on releases to which they must comply</th>
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<td>Strategic action 4.2.1</td>
<td>See Strategic Action 2.1.1</td>
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<tr>
<th>Objective 4.3</th>
<th></th>
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<td>Strategic action 4.3.1</td>
<td>IUTW will work with the Environmental Protection Board towards taking court action against worst operators</td>
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<table>
<thead>
<tr>
<th>Action Step #1</th>
<th>Hire an environmental lawyer and investigate how existing environmental laws &amp; regs are currently implemented in the Kurdistan Region.</th>
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<table>
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<tr>
<th>Action Step #2</th>
<th>Create a help desk for industries to provide legal assistance on what they must do to comply with existing regulations.</th>
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<thead>
<tr>
<th>Action Step #3</th>
<th>Research a list of potential target polluters and the options for pursuit of legal action against each; identify pros and cons, consult with stakeholders and develop a strategy for a potential suit</th>
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<table>
<thead>
<tr>
<th>Action Step #4</th>
<th>Find out where factory waste goes and if it is possible to take water samples to see how the water has been affected from the factories to build cases against polluting industries</th>
</tr>
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</table>
## Tanjero River Threat Assessment Survey and Outreach Project

| Action Step #5 | Implement a pilot legal action against a selected polluter from the targeted list prepared with the KEPIB |

The following strategic actions and action steps have been identified for Objectives 5.1 and 5.2 to address threats from the building of small and large dams:

### Objective 5.1
By 2025, general public & government stakeholders are informed of the threat from dams and diversion projects

| Strategic Action 5.1.1 | Implement a Dam Awareness Campaign |

| Action Step #1 | Obtain information on location of all dam projects in the KRG |
| Action Step #2 | Develop a PSA on dams and their pros and cons |
| Action Step #3 | Conduct public debates and media events where pros and cons of dam development are debated |

| Strategic Action 5.1.2 | Connect to regional/national impacts through the Save the Tigris Campaign |

| Action Step #1 | Participate in Save Tigris Campaign |
| Action Step #2 | Develop a network of Waterkeeper volunteers that will be the eyes and ears of the program throughout the Tigris Basin |

### Objective 5.2
By 2029, all dam projects are subject to rigorous EIA requirements

| Strategic Action 5.2.1 | Make sure that existing rules and regulations are implemented properly |

| Action Step #1 | Collect information and develop a case study of several dam projects in the KRG and investigate how they were handled |
| Action Step #2 | See Strategic Action 2.1.1 |
| Action Step #3 | Work with the KEPIB and municipal stakeholders to implement pilot programs for waste handling |
| Action Step #4 | Consider legal action against "Worse Polluters/Garbage Dumpers" |

The following strategic actions and action steps have been identified for Objectives 6.1 and 6.2 to address threats from animal grazing and farms animals degrading river quality:

### Objective 6.1
By 2029, local and government stakeholders are aware of the threat from animal grazing and access to rivers

| Strategic Action 6.1.1 | Research and report on this issue to determine the extent of the problem |

| Action Step #1 | Conduct in-depth case studies to determine the severity of this threat to rivers, biodiversity and water quality and what local attitudes to these issues are. |
| Action Step #2 | Develop a PSA/brochure on best practices for farmers and related stakeholders |
| Action Step #3 | Conduct outreach to the College of Agriculture, Animal |

### Objective 6.2
By 2029, all dam projects are subject to rigorous EIA requirements
Tanjero River Threat Assessment Survey and Outreach Project

<table>
<thead>
<tr>
<th>Objective 6.2</th>
<th>By 2030, access to and grazing in the riparian areas by domestic animals now restricted</th>
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<tr>
<td>Strategic Action 6.2.1</td>
<td>Build legislative/regulatory framework to address this issue</td>
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<tr>
<td>Action Step #1</td>
<td>Examine current framework and identify gaps that should be filled</td>
</tr>
<tr>
<td>Action Step #2</td>
<td>Lobby for rules and regulatory changes and updates</td>
</tr>
<tr>
<td>Action Step #3</td>
<td>Build capacity for enforcement</td>
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The following strategic actions and action steps have been identified for Objectives 7.1 and 7.2 to address threats from small holder farms:

| Threat 1. Agriculture: Small Holder farms (annual, perennial, non-timber, vegetable farming) |
| Objective 7.1 | By 2030, local and government stakeholders aware of threats from small holder farm encroachment on Iraqi waterways |
| Strategic Action 7.1.1 | Research and report on this issue to determine the extent of the problem |
| Action Step #1 | Conduct in-depth case studies to determine the severity of this threat to rivers, biodiversity and water quality and what local attitudes to these issues are. |
| Action Step #2 | Develop a PSA/brochure on best practices for farmers and related stakeholders |
| Action Step #3 | Conduct outreach to the College of Agriculture, Animal Science programs to build capacity and understanding on these issues. |
| Objective 7.2 | By 2030, clearance of land along streams and riverways is subject to stronger controls |
| Strategic Action 7.2.1 | Build legislatives/regulatory framework to address these issues |
| Action Step #1 | Examine current framework and identify gaps that should be filled |
| Action Step #2 | Lobby for rules and regulatory changes and updates |
| Action Step #3 | Build capacity for enforcement |

The following strategic actions and action steps have been identified for Objectives 8.1 and 8.2 to address threats from general agro-chemical pollution:

| Threat 1. Agriculture: Agro-Chemical pollution |
| Objective 8.1 | By 2025, farmers and local government stakeholders aware of threats from agricultural pollution (herbicide, pesticide, animal waste and sediment runoff) |
| Strategic Action 8.1.1 | Research and report on this issue to determine the extent of the problem |
| Action Step #1 | Conduct in-depth case studies to determine the severity of this threat to rivers, biodiversity and water quality |
## Tanjero River Threat Assessment Survey and Outreach Project

| Action Step #2 | Develop a PSA/brochure on best practices for farmers and related stakeholders |
| Action Step #3 | Conduct outreach to the College of Agriculture, Animal Science programs to build capacity and understanding on these issues. |

**Objective 8.2** By 2028, agricultural Pollution to streams and waterways is subject to stronger controls

**Strategic Action 8.2.1** Build legislatives/regulatory framework to address these issues

| Action Step #1 | Examine current framework and identify gaps that should be filled |
| Action Step #2 | Lobby for rules and regulatory changes and updates |
| Action Step #3 | Build capacity for enforcement |

The following strategic actions and action steps have been identified for Objectives 9.1 and 9.2 to address illegal fishing methods:

### Threat 5. Over-exploitation: Illegal fishing- electric fishing, poison, bombing.

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<tr>
<td>Objective 9.1 <strong>By 2026,</strong> general public and agency stakeholders are aware of threat for unsustainable fishing practices</td>
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<tr>
<td>Strategic Action 9.1.1 <strong>Implement a Sustainable Fisheries Campaign</strong></td>
</tr>
<tr>
<td>Action Step #1</td>
</tr>
<tr>
<td>Action Step #2</td>
</tr>
<tr>
<td>Action Step #3</td>
</tr>
</tbody>
</table>

| Objective 9.2 **By 2025,** unsustainable fishing practices are subject to tough fines and have been eliminated for local waterways |
| Strategic Action 9.2.1 **Build capacity of Forestry Police as well as fishermen on sustainable hunting rules** |
| Action Step #1 | Conduct education programs for Forestry Police on fishing rules and how to enforce them |
| Action Step #2 | Encourage the formation of local fishermen associations who can encourage compliance with their members to fishing rules |

The following strategic actions and action steps have been identified for Objectives 10.1 and 10.2 to address Climate Change risks:

### Threat 11. Climate change & severe weather:

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<tr>
<th>Objectives</th>
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</thead>
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<tr>
<td>Objective 10.1 <strong>By 2026,</strong> country-level climate adaptation needs well assessed</td>
</tr>
<tr>
<td>Strategic Action 10.1.1 <strong>PLANNING FOR IMPROVED ADAPTATION AND RESILIENCE</strong></td>
</tr>
<tr>
<td>Action Step #1</td>
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## Tanjero River Threat Assessment Survey and Outreach Project

<table>
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<tr>
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<th>Action Step #2</th>
<th>Action Step #3</th>
<th>Action Step #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Invest in climate monitoring and forecasting systems, and make climate services available to key stakeholders and the general public</td>
<td>Adopt multi-stakeholder participatory approaches</td>
<td>Ensure needs of the most vulnerable are defined and met</td>
<td>Align taxation system to climate adaptation objectives</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 10.2</th>
<th>By 2025, collecting needed Climate Data/information and outreach projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Action 10.2.1</td>
<td>decisions made by policy makers guided by relevant climate data and services</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action Step #1</th>
<th>Action Step #2</th>
<th>Action Step #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regularly monitor and synthesize shorter- and longer-term, national and sub-national climate risks and impacts</td>
<td>Raise public awareness on climate risks and launch education or communication campaigns</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 10.3</th>
<th>By 2025, informing government institutions on climate change risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Action 10.3.1</td>
<td>government institutions prepared to address climate change risks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Action Step #1</th>
<th>Action Step #2</th>
<th>Action Step #3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improve cross-ministerial and cross-country coordination</td>
<td>Improve policy effectiveness through transparent monitoring and compliance</td>
<td>Build institutional capacity for climate risk analysis, planning, and project implementation</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objective 10.4</th>
<th>By 2027, Climate adaptations required are met</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Action 10.4.1</td>
<td>incentives in place for appropriate climate adaptation actions</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Action Step #1</th>
<th>Action Step #2</th>
<th>Action Step #3</th>
<th>Action Step #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce economic inefficiencies caused by poor policies</td>
<td>Internalize externalities (e.g., carbon pricing, risk-based insurance)</td>
<td>Introduce norms and regulations (e.g., land use plans, zoning regulations)</td>
<td></td>
</tr>
</tbody>
</table>
6. Acknowledgements
Waterkeepers Iraq Organization would like to thank the followings for their contribution to this work.
Authors: Bnwar Rzgar Abdulrahman, Shad Azad Rahim
Editor: San Saravan
Field Workers: Bnwar Rzgar Abdulrahman, Nabil Ibrahim Musa
Funder: EU-UNDP
Partners: Humat Dijlah, Sulaimani Environment Directory

7. References

Annex 1: All Threats with GPS coordinates and threat score

<table>
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<tr>
<th>Category</th>
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<th>Impact Score</th>
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### Tanjero River Threat Assessment Survey and Outreach Project

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## Tanjero River Threat Assessment Survey and Outreach Project

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Tanjero River Threat Assessment Survey and Outreach Project

For more Information
Your feedback, thoughts and ideas are most welcome. We also encourage you to contact us and learn more about the Waterkeepers Iraq. We welcome new members, volunteers and interns.

Contact the Waterkeepers Iraq at:
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+964 (0)7703594408
https://www.waterkeepersiraq.org/

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