



# Lesser Zab Threat Assessment & Action Plan (TAAP) Report

## January 2013

---

### Introduction

The Lesser Zab Threat Assessment took place throughout 2012 and was funded by the Rufford Small Grants Fund and Nature Iraq. It consisted of surveys of the Lesser Zab River and its major tributaries 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 the Kurdistan Environmental Protection and Improvement Board and was the first effort of its kind in Iraq that visited the entire basin using such comprehensive surveys.

In addition to an 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.

### Study area

The Little (Lower or Lesser) Zab River has its origins in Iran, where two small streams join together to form the Chami Kalveh (Cham e Kalveh) in the Azarbayjani-Gharbi region. The Chami Kalveh flows in a South-Southeastly direction until it enters Iraq near Mawat, where it joins with the Nahr Siwayl River (this river and its smaller tributaries bear a variety of local names), which lies entirely in Iraq, in the Penjwin area. From Mawat to Rania, the river travels a narrow passage in a north-westerly direction, until it enters the wide basin of the Dukan Lake. It flows southwest for 402 km through Iraq to join the Tigris north of Bayji town. The total catchment area of the Lesser Zab is 22,250 km<sup>2</sup>.

Water utilization of the Lesser Zab upstream of Dukan started making its marks on the hydrological regime of the River after 1991 when medium to small size agricultural projects were implemented in Iraq and Iran. Since 1991, the average volume of water entering the Dukan Reservoir totals 5.72 Billion cubic meters (BCM)/year, slightly less of the 6.02 BCM/year measured for the entire observation period from 1931 to 2008. According to various sources<sup>1 2</sup> the annual volume originated in Iran amounts to 2.85 BCM.

---

<sup>1</sup> "Transboundary waterways and streams along the Iraq-Iran border line... the reality and the future", by Mukdad H. Ali, Baghdad University

<sup>2</sup> General Scheme of Water Resources and Land Development in Iraq, Volume IV ,paragraph 2.2 ,table 2.1, page 64, 1982, SELKHOZPROMEXPORT

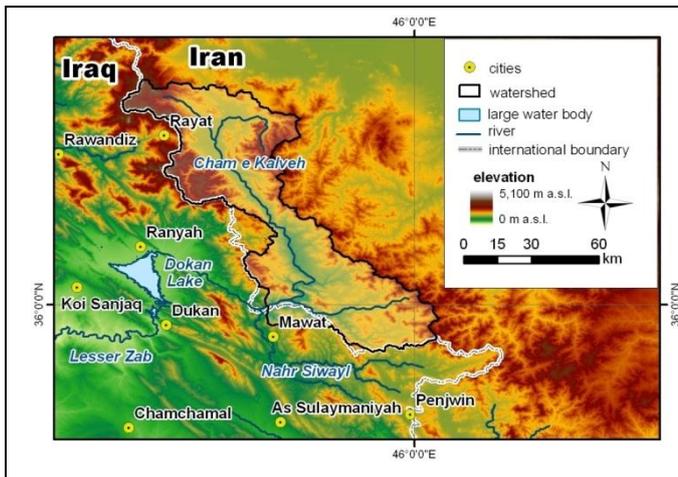


Figure 1: Upper Lesser Zab River

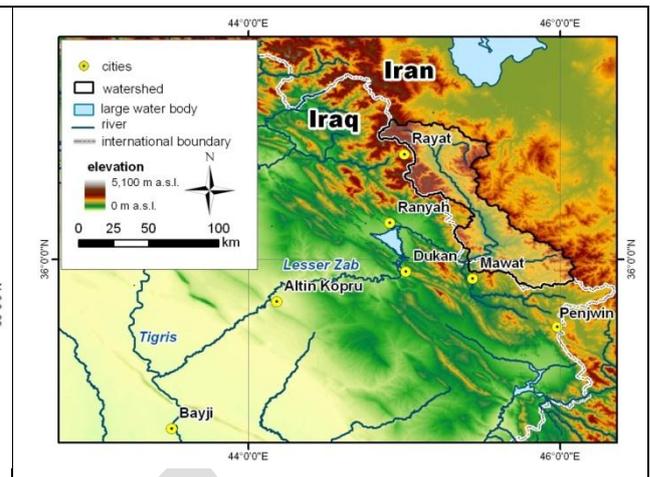


Figure 2: Entire Basin of Lesser Zab River

The catchment area of the Lesser Zab River in the Iranian territory has an extension of 4,470 km<sup>2</sup> at the border between Iraq and Iran (**Error! Reference source not found.** above). The upper basin of the Lesser Zab lies within the mountainous region with elevation ranging from 659 m a.s.l. to 3,591 m a.s.l. The longest flow path of the Lesser Zab inside Iran is estimated at 165 km long.

The following images were taken during the 2012 survey and are presented to show areas in the upper and lower parts of the basin within Iraq.



Shabadin to Marwe Reach in the Upper Basin (main stem)



Qarnaqaw Qandil To Sangasar Reach (tributary)



Junction of Nahr Siwayl River (bottom left) with Lesser Zab north of the town of Mawat (tributary and main stem)



Albaney Village (Albaney to Daraban Reach) (main stem)



## Methodology

### Threat Assessment

The Iraq Upper Tigris Waterkeeper conducted a threat assessment starting in February 2012 and completing in December 2012; the primary work was in late winter, spring, and fall. 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) Model outlined and carried out by the Nature Iraq Key Biodiversity Areas Project. 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 canalisation.
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.

### 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:**

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

<i>Scope of selected threats</i>	<i>Scope score</i>
Whole area/population (>90%)	3
Most of area/population (50-90%)	2
Some of area/few individuals (10% - 49%)	1
Small area/few individuals (<10%) or No Threat	0
Not evaluated	blank

<i>Severity of selected threat</i>	<i>Severity Score</i>
Rapid deterioration (>30% over 10 years or 3 generations, whichever is longer)	3
Moderate deterioration (10-30% over 10 years or 3 generations)	2
Slow deterioration (1-10% over 10 years or 3 generations)	1
No or imperceptible deterioration (<1% over 10 years) or No Threat	0
Not evaluated	blank

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

$$\text{Impact Score} = \text{Timing Score} + \text{Scope Score} + \text{Severity Score}$$

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 or Very High threat based on the following scale:

<b>Impact Score =</b>	<b>Threat Status Score</b>
<b>0 =</b>	<b>0 Low</b>
<b>3-5 =</b>	<b>1 Medium</b>
<b>6-7 =</b>	<b>2 High</b>
<b>8-9 =</b>	<b>3 Very High</b>

## 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 Nature Iraq Staff and/or a volunteer.

## River Reach

The survey method for the Lesser Zab Threat Assessment is known as a “River Reach”, which is defined as a section of river that can be surveyed in a single day or, alternatively, is a geographical segment that is generally homogeneous in terms of habitat and morphology. Thus based on terrain and ease of access, the river reaches on the Lesser Zab River utilized in this project were of varying size (ranging from as small as 4.8 km to over 70 km). The perpendicular extent of the survey was defined by the line of sight of the field team. The team made attempts to view the entire area on each bank of the river that was deemed to have a direct effect on the basin but this was occasionally not possible for logistical reasons and rough terrain, and thus in some areas only a small portion of each bank could be viewed.

## Record Keeping

The start and end GPS Coordinates were identified and the name of the reach consisted of the name of the starting area or village name to the ending area or village name, as in: “Suraban Bridge to Mokaba

Village”. A Nature 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 reach 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 a Microsoft Access Database.

## Data & Discussion

### THREATS

The main threats on Lesser Zab by sector are as follows:

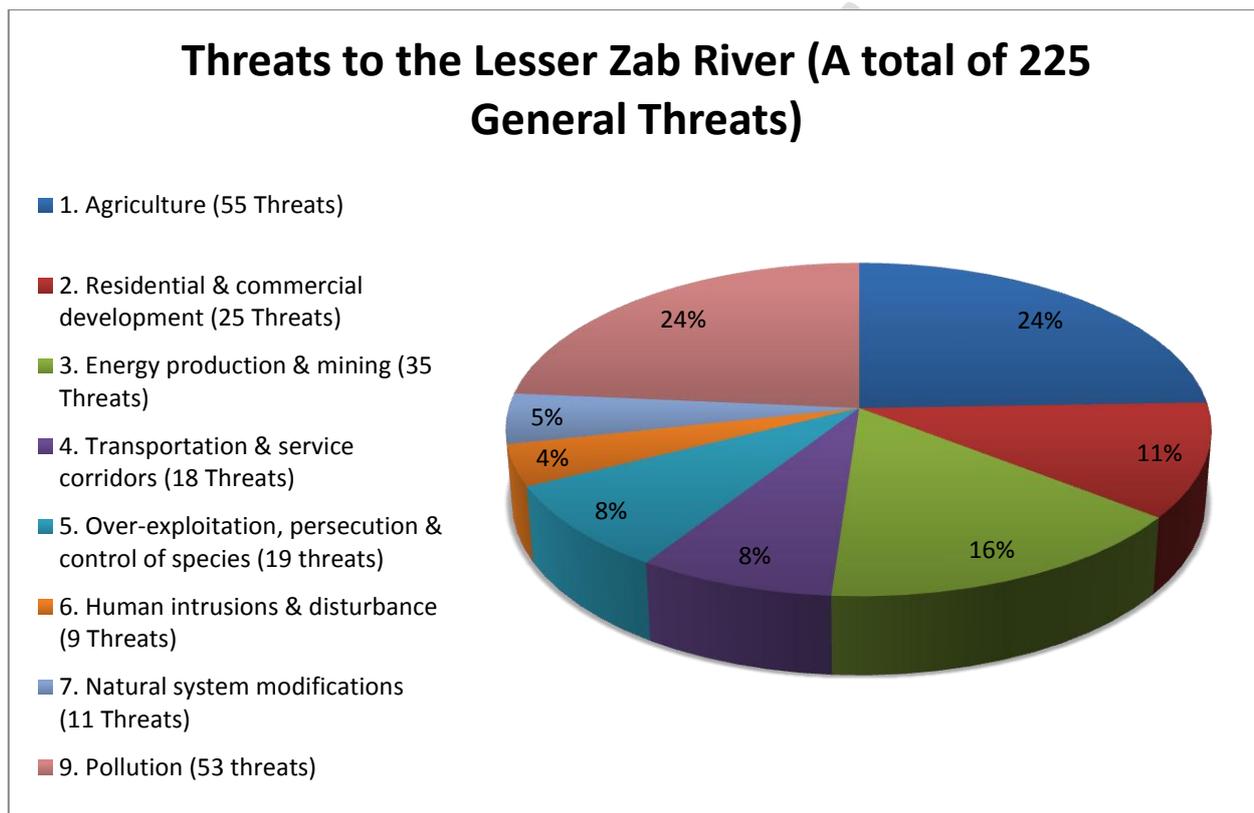


Figure 3: Threats to the Lesser Zab River by Threat Type

Scoring of Lesser Zab River Threats was as follows:

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

Threat Types	Average Impact Score	Highest Impact Score	Total # of Threats
1. Agriculture	3 (Medium Threat)	7 (High Threat)	55
2. Residential & commercial development	3 (Medium Threat)	7 (High Threat)	25
3. Energy production & mining	6 (High Threat)	8 (Very High Threat)	35
4. Transportation & service corridors	3 (Medium Threat)	6 (High Threat)	18
5. Over-exploitation, persecution & control of species	1 (Low Threat)	6 (High Threat)	19

Threat Types	Average Impact Score	Highest Impact Score	Total # of Threats
6. Human intrusions & disturbance	5 (Medium Threat)	8 (Very High Threat)	9
7. Natural system modifications	4 (Medium Threat)	7 (High Threat)	11
8. Invasives & other problematic species and genes	Not assessed		
9. Pollution	3 (Medium Threat)	7 (High Threat)	53
10. Geological events	Not assessed		
11. Climate change and severe weather	Not assessed		
Total # of Threats			225

Threat types represent general threats to the reach. 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 2).

Table 2: Threat types and the specific threats seen on the river reaches

Threat Types	Specific threats	# of GPS-located threats
3. Energy production & mining	Gravel mining, Potential oil development	4 Very High, 14 High & 3 Medium and 3 Low threats for gravel mining
6. Human intrusions & disturbance	Minefields and materials left over from Iran/Iraq war	1 High and 2 Medium threats related to disturbances from villages and work or related activities
7. Natural system modifications	Dams and water management (from proposed dam or existing dams)	1 High threat caused by sediment loading in the river due to gravel mining and 2 High and 1 Low threat from existing or proposed dams
9. Pollution	Garbage and waste from villages; Sewage and wastewater; Noise pollution from gravel mining, smuggling	1 High, 2 Medium and 3 Low threats from sewage water and garbage dumping
1. Agriculture	Combination of fish farms, small farms, animal grazing and agro industry farms	1 High, 2 Medium & 5 Low threats from farming (including fish farming)
2. Residential & commercial development	Housing developments; recreational development; 1 refinery on the river bank	1 High threat from an oil production facility; 1 Medium threat from a gravel mine facility
5. Over-exploitation, persecution & control of species	Electro-fishing	No specific GPS-located threats
4. Transportation & service corridors	River crossings; tertiary dirt roads for gravel mines; areas used by	6 Low threats from bridge and other river crossings

## Threat Maps

A series of GIS Maps have been prepared from the data that provide more comprehensive information on where the highest threats are occurring along the Lesser Zab River for each threat category. In the following maps, only a short segment of the main stem of the Lesser Zab was not surveyed for logistical reasons (from Du-Choman in Mawat to Waysi Bridge), the area between Reach 11 & 12. The reach list is shown in Annex 1.

Please note that each reach is entirely color-coded to the threat level assessed for the reach. Actual threats may be somewhat localized within a particular reach, for example on the Mining and Resource Extraction map, Reach 14 & 15 are considered at high risk to these types of threats (specifically gravel mining) but in reality, the upper part of the reach is at low or even no risk as gravel mining activities are focused and concentrated in the lower part of the reach only.

Except in the area between Reach 11 & 12 (an area not visited in the survey), if there is no color coding of the river reaches, this indicates that this section of the reach is not deemed to be under threat or these types of threats were simply not observed during the survey effort.

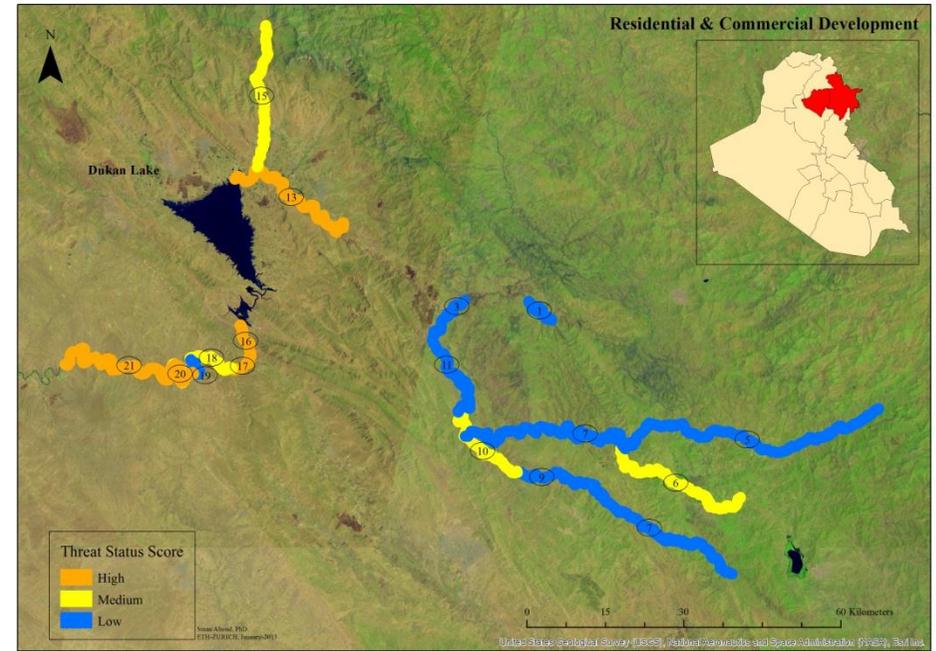
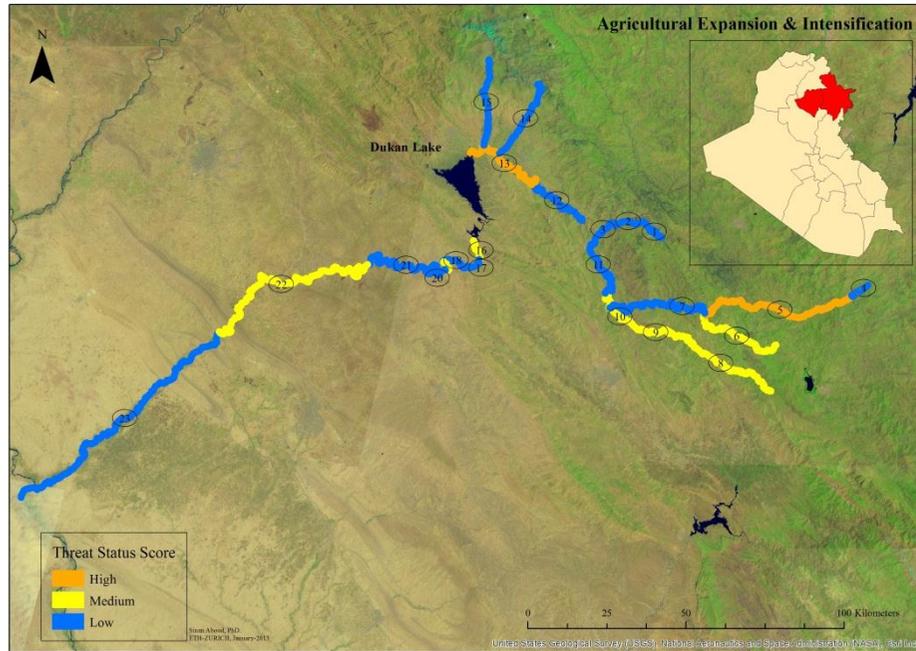
## Concluding Remarks & Recommendations

The Threat Maps are not meant to make definitive, final statements regarding the threats affecting the the Lesser Zab 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 Lesser Zab River Basin or other natural, surface waters of the region. The RiverWatch, an additional program of Waterkeepers Iraq funded by the German Foreign Federal Office and Nature Iraq, attempts to address this need but at best covers only a central portion of the Lesser Zab Basin (as well as a portion of the Tanjero/Upper Diyala Basin). 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 where 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.

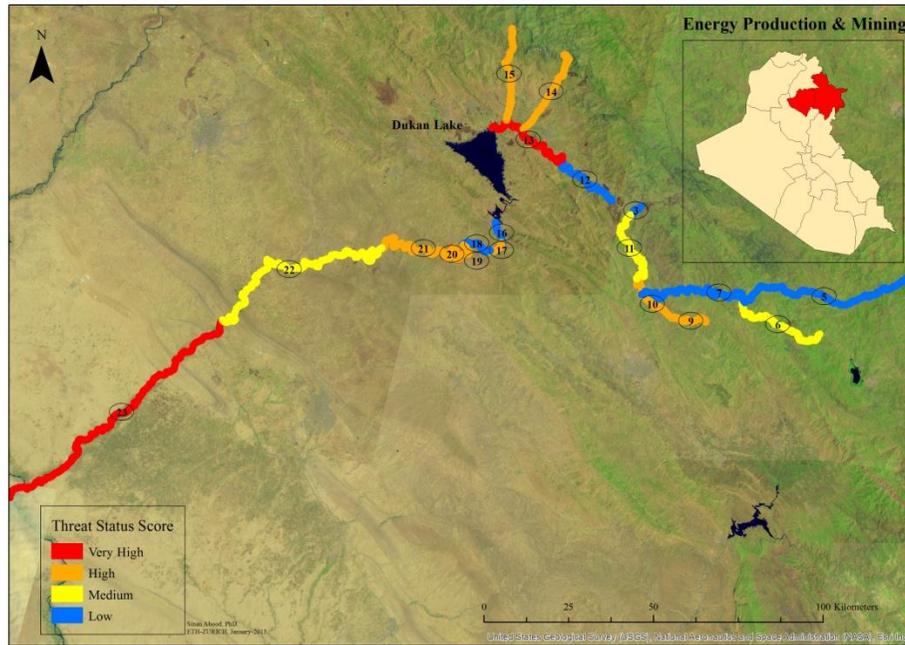
1. Agriculture\*

2. Residential & commercial development\*

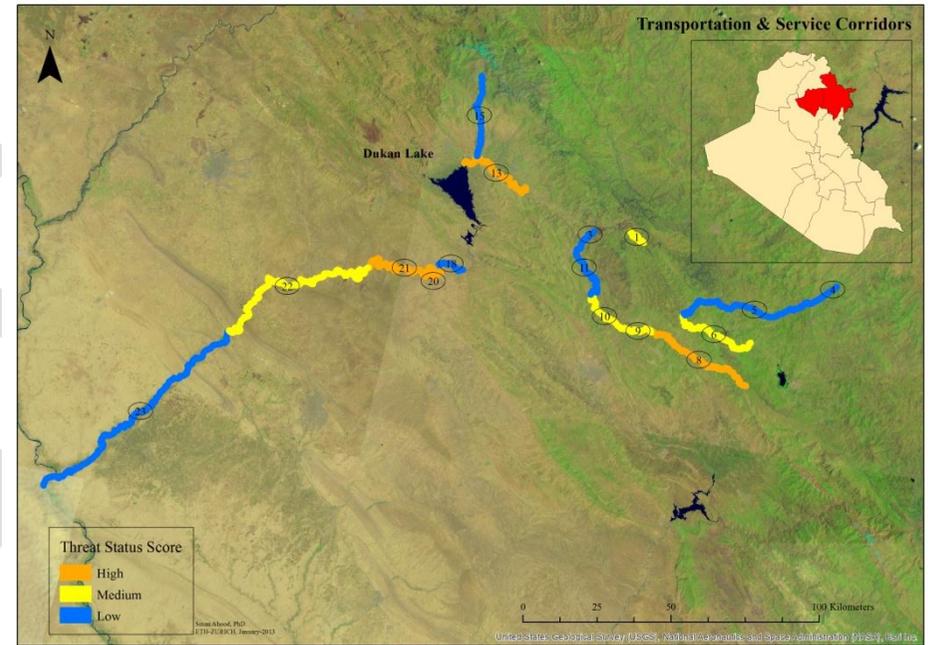


\*Note: See Annex 1 for Reach List

### 3. Energy production & mining\*

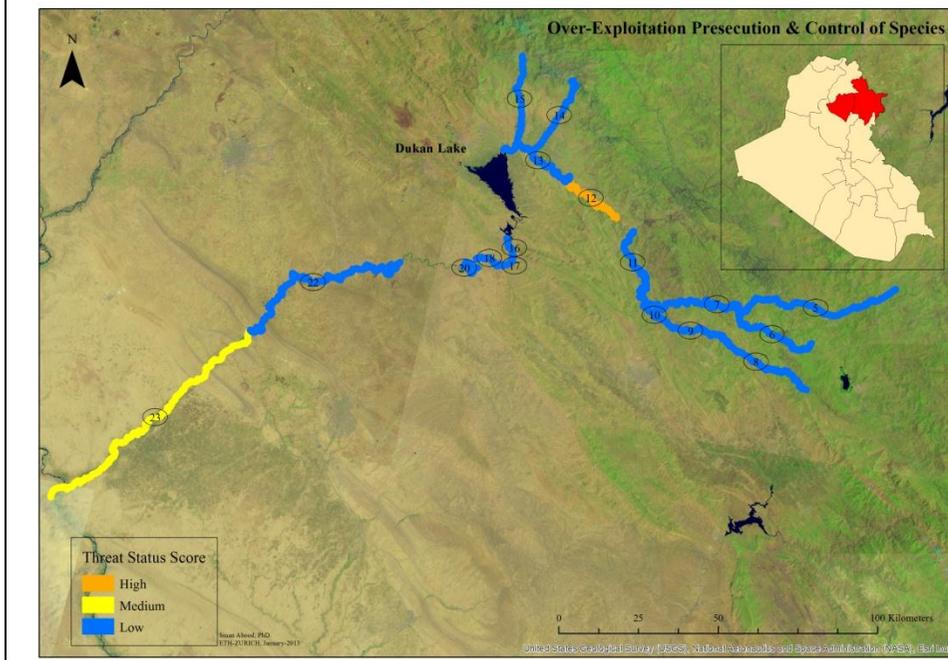


### 4. Transportation & service corridors\*

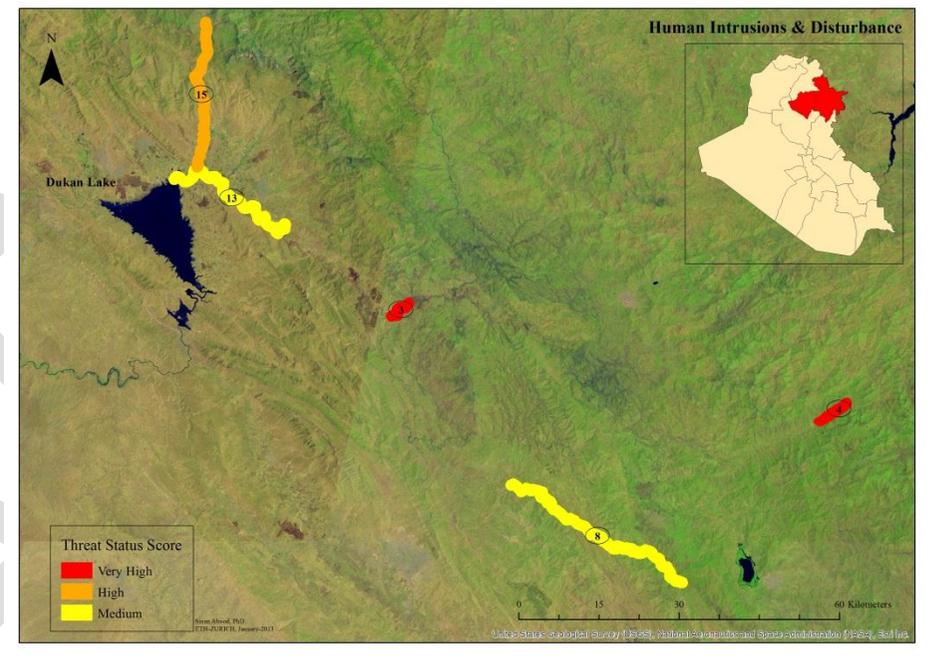


\*Note: See Annex 1 for Reach List

5. Over-exploitation, persecution & control of species\*

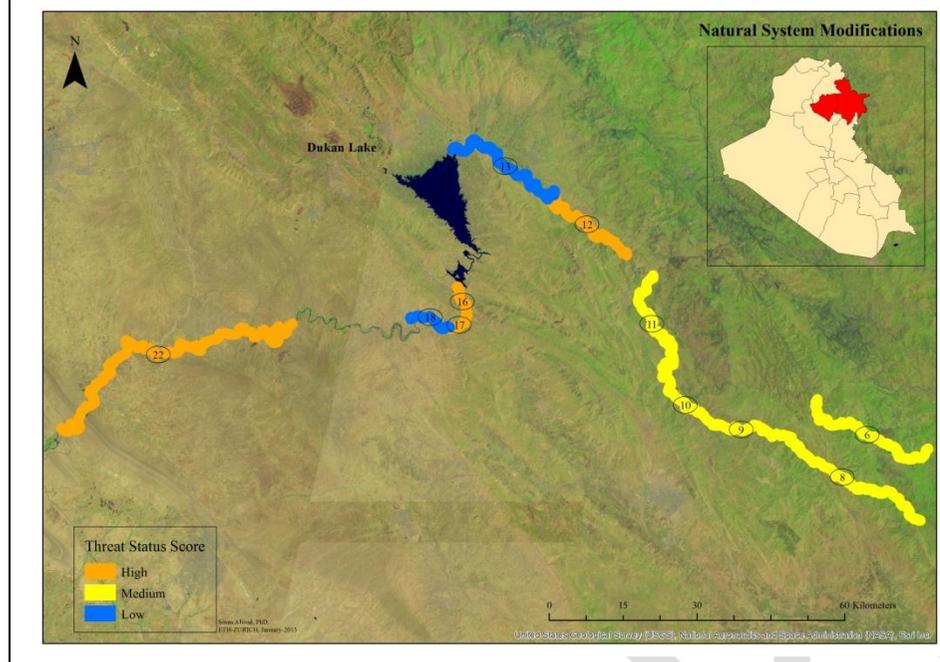


6. Human intrusions & disturbance\*

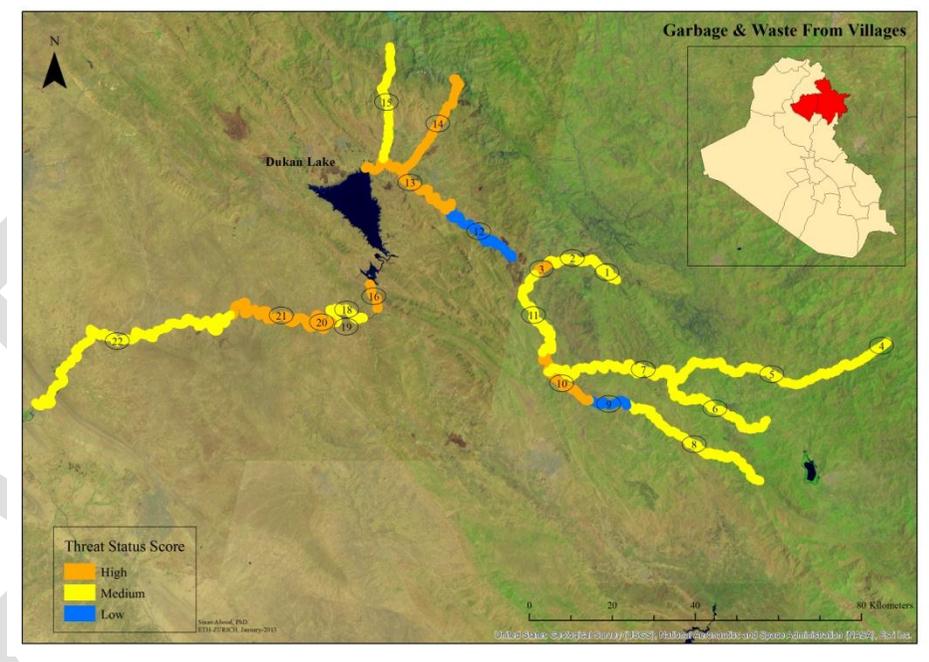


\*Note: See Annex 1 for Reach List

### 7. Natural system modifications\*



### 9. Pollution\*



\*Note: See Annex 1 for Reach List

## ACTION PLAN

Based on an assessment of the threats observed on the Lesser Zab 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). Thirteen 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 Program 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 Program and related initiatives of Nature Iraq and its partner governmental institutions and non-governmental organizations.

1) The following strategic actions and action steps have been identified for Strategic Objective 1.1, 1.2, & 1.3 to address one of the highest threats seen on the Lesser Zab River: Gravel mining.

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

<b>Objective 1.1</b>	<i>By 2014, local and government stakeholders are informed of threats from in-stream gravel mining</i>
<u>Strategic action 1.1.1</u>	<u>Collect and publish information on in-stream gravel mining for key stakeholders</u>
Action Step #1	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.
Action Step #2	Obtain old photographs of areas before gravel mining operations occurred to compare with photos taken after operations were conducted
Action Step #3	Refine objectives, strategic actions and action steps accordingly, update the action plan; translate and publish in a white paper on gravel mining
<u>Strategic action 1.1.2</u>	<u>Implement a Gravel Mine Awareness Program targeting local people, decision-makers &amp; the industry itself</u>
Action Step #1	Make a documentary about how people, villagers and farmers and the land itself are affected from gravel mining.
Action Step #2	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.
Action Step #3	Take the media to areas such as Goptapa area, where about 15 gravel mines are working at the same time, and as a result an enormous area has been affected. Apparently in 1970s this area was a forest, but now you can hardly see any trees.
<b>Objective 1.2</b>	<i>By 2017, gravel mining operations are licensed and in compliance with environmental rules</i>
<u>Strategic action 1.2.1</u>	<u>Pursue steps to encourage stronger regulations and compliance within the mining sector regarding riparian and in-stream gravel mining</u>
Action Step #1	Document the permitting and licensing process (who is responsible for giving gravel mines licenses and how are they obtained?)
Action Step #2	Document and map the number and location of legal and illegal operations and identify enforcement/compliance activities of relevant authorities that have been pursued.

	Action Step #3	Develop and advocate for recommendations for improvement to the licensing and compliance process.
<b>Objective 1.3</b>	By 2020, riparian and in-stream habitats and functions have been restored	
	<u>Strategic action 1.3.1</u>	<u>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.</u>
	Action Step # 1	Designate an area for a pilot restoration program that demonstrates a number of alternative restoration techniques
	Action Step # 2	Document restoration techniques and conduct training and capacity building programs for government agencies, gravel mining operation owners/staff and restoration professionals

**2) The following strategic actions and action steps have been identified for Strategic Objective 2.1 to address municipal sewage and wastewater issues:**

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

<b>Objective 2.1</b>	By 2014, local communities and government stakeholders are informed of threats from municipal sewage and wastewater problems	
	<u>Strategic action 2.1.1</u>	<u>Implement the RiverWatch Project (initially funded by the German Foreign Federal Office) and promote its Citizen Science/ Education methodology</u>
	Action Step #1	Run at least 72 Water Quality monitoring trips per year, with a minimum of 25 different stakeholder groups involved in these trips
	Action Step #2	Develop at least 4 RiverWatch actions/activities per year to increase community involvement and awareness
	Action Step #3	Release the annual scorecard at a public press conference and event to build pressure to promote better wastewater handling
	<u>Strategic action 2.1.2</u>	<u>Promote better understanding of the sources of these problems</u>
	Action Step #1	Document, photograph, GPS locate and map all key sources of municipal sewage and wastewater to local waterways
	Action Step #2	Publish a report on major municipal pollution inputs to local waterways in four sample areas (e.g. Rania, Sulaimaniyah, Dukan, and Said Sadiq) that list recommendations for solutions and present to the Kurdistan Environment Board/Ministry of Environment and other government stakeholders and release publically in a press conference. These four areas will serve as a model for other areas.
<b>Objective 2.2</b>	Action Step #3	Publish and promote information (brochure, information booth, presentations) on waste handling options and alternatives
	By 2018, eliminate municipal sewage, wastewater and garbage pollution from entering untreated into local waterways from major towns and cities in Sulaimani	
	<u>Strategic action 2.2.1</u>	<u>Implement small scale pilot projects to address municipal sewage and garbage issues</u>
	Action Step #1	Develop a pilot project wastewater garden/constructed wetland to demonstrate small scale methods to address sewage pollution
	Action Step #2	Develop demonstration programs for local residents about how to decrease water use and handle waste water issues generated in the home.

**3) The following strategic actions and action steps have been identified for Strategic Objectives 3.1 and 3.2 to address garbage dumping at the village level and by picnickers and the general public.**

**Threat 9. Pollution: Garbage dumping from villagers, picnickers and general public**

**Objective 3.1**

*By 2019, garbage dumping along rivers and in natural areas has been eliminated.*

Strategic Action 3.1.1

Develop an awareness and outreach program

Action Step #1

Outreach is really important around the villages and picnic areas. This could be conducted in the form of a performance, or by giving out information to encourage people to be responsible for the area they use by the riverbank.

Action Step #2

Take the educational film (The Waterkeeper) to villages that are near the river.

Action Step #3

Make sure that the government provides garbage bins and pick-up services at busy tourist areas (particularly during Nawruz/spring)

Action Step #4

Develop alternative enviro-ed signs and post on billboards along roads

**Objective 3.2**

*By 2015, local streams and tributaries cleared of garbage*

Strategic Action 3.2.1

Implement an "Adopt A Stream" Waterkeeper volunteer program and encourage expansions of the program and adoption of stream sections by other groups

Action Step #1

Select a specific site in Dukan that is annually visited for Clean up activities at various times of the year.

Action Step #2

Conduct a census of the types and amounts of garbage cleaned up during these activities and provide a public report

Action Step #3

Develop a brochure on how to create similar programs in other locations and promote in other waterways and basins

Strategic Action 3.2.2

Encourage the recycling of various waste streams (i.e. plastics/nonbiodegradable, food and organic wastes/biodegradable) in collaboration with local municipalities

Action Step #1

Work with the municipality of Suliamani and other towns to develop recycling pilot projects

4) The following strategic actions and action steps have been identified for Strategic Objectives 4.1 and 4.2 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"**

**Objective 4.1**

*By 2014, problems and issues around garbage dumping clear to stakeholders and alternatives are being considered*

Strategic Action 4.1.1

Develop an awareness and outreach program to municipalities and local businesses

Action Step #1

Develop a brochure about proper waste handling

Action Step #2

Work with KEPIB to develop guidelines for municipalities

Action Step #3

Work with municipality of Suliamani and others to develop incentive programs for businesses

Action Step #4

Implement an Award program for the "Worst Polluters/Garbage Dumpers" ... with specific categories such as "worst polluting restaurant", etc (or do a top 10 list) and publically present these awards.

Action Step #5

Create a media campaign that focuses on the top "garbage dumpers" with newspapers, local TV and other media outlets

Strategic Action 4.1.2

See Strategic Action 3.2.2

**Objective 4.2**

*By 2019, garbage dumping along rivers and in natural areas has stopped.*

Strategic Action 4.2.1

Better rules and enforcement in place to control both legal and illegal dumping

Action Step #1	Research existing rules, regulation and enforcement patterns that govern garbage dumping at the municipal level and for small businesses (eg. restaurants, etc.)
Action Step #2	Work with KEPIB to develop guidelines for municipalities
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"

5) 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:

**Threat 7. Natural Resource Modification: Building of small and large dams**

<b>Objective 5.1</b>	<i>By 2015, general public &amp; government stakeholders are informed of threat from dams and diversion projects</i>
<u>Strategic Action 5.1.1</u>	<u>Implement a Dam Awareness Campaign</u>
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
<u>Strategic Action 5.1.2</u>	<u>Connect to regional/national impacts through the Mesopotamian Outreach Project</u>
Action Step #1	Participate in the Tigris River Flotilla
Action Step #2	Develop a network of Waterkeeper volunteers that will be the eyes and ears of the program throughout the Tigris Basin
<b>Objective 5.2</b>	<i>By 2018, all dam projects are subject to rigorous EIA requirements</i>
<u>Strategic Action 5.2.1</u>	<u>Make sure that existing rules and regulations are implemented properly</u>
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 #1	<i>See Strategic Action 6.2.1</i>

6) The following strategic actions and action steps have been identified for Objectives 6.1 and 6.2 to address industrial wastes:

**Threat 9. Pollution: Industrial Wastes (Tar factories, oil refineries, cement block factories, and chicken factories )**

<b>Objective 6.1</b>	<i>By 2014, increase local community and government awareness about the pollution caused by these facilities</i>
<u>Strategic Action 6.1.1</u>	<u>See Strategic Action 2.1.1</u>
<b>Objective 6.2</b>	<i>By 2015, industrial facilities informed of laws and regulations, and limits on releases to which they must comply</i>
<u>Strategic Action 6.2.1</u>	<u>See Strategic Action 4.1.1</u>
<b>Objective 6.3</b>	<i>By 2014, Waterkeepers Iraq will initiate a legal program</i>
<u>Strategic Action 6.3.1</u>	<u>IUTW will work with the Environmental Protection Board towards taking court action against worst operators</u>

Action Step #1	Hire an environmental lawyer and investigate how existing environmental laws & regs are currently implementation in the Kurdistan Region.
Action Step #2	Create a help desk for industries to provide legal assistance on what they must do to comply with existing regulations.
Action Step #3	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
Action Step #4	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
Action Step #5	Implement a pilot legal action against a selected polluter from the targeted list prepared with the KEPIB

**7) The following strategic actions and action steps have been identified for Objectives 7.1 and 7.2 to address fish farms:**

**Threat 9. Pollution & Threat 7. Natural Systems Modification: Fish farms**

**Objective 7.1** *By 2015, local and government stakeholders are aware of threat from fish farming along rivers*

Strategic Action 7.1.1 Implement an Awareness program

Action Step #1 Conduct research into how these activities are designed, licensed, developed and managed.

Action Step #2 Publish a report on fish farming in Kurdistan and release to stakeholders and the public

Action Step #3 Develop a brochure to fish farm operations on best practices

**Objective 7.2** *By 2020, make sure that all such river-side activities have a license and are being operated properly*

Strategic Action 7.2.1 See Strategic Action 6.2.1

**8) The following strategic actions and action steps have been identified for Objectives 8.1 and 8.2 to address car washing:**

**Threat 9. Pollution & Threat 7. Natural Systems Modification: Car Washing**

**Objective 8.1** *By 2015, general public are aware of threat from car washing*

Strategic Action 8.1.1 Implement a Car Washing Awareness Raising Campaign

Action Step #1 Develop a PSA on car washing and its impacts

Action Step #2 Conduct outreach activities at popular places for car washing

Action Step #3 Develop a cooperative relationship with legitimate car washing facilities in these activities.

Action Step #4 Develop educational signage in popular places for car washing

**Objective 8.2** *By 2018, car washing in streams and rivers is stopped and anyone who does this is fined*

Strategic Action 8.2.1 Block access to areas where car washing has occurred

Action Step #1 Work with local authorities to place aesthetically pleasing fencing, soil berms and large rocks to block off access of cars to the river (i.e. Salaam Bridge near Said Sadiq) - turn these area into picnic locations

Strategic Action 7.2.2

Action Step #1

Action Step #2

Car washing subject of fines that are enforced

Capacity building program for enforcement and regulatory agencies

See Strategic Action 6.2.1

9) 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.**

**Objective 9.1**

*By 2015, general public and agency stakeholders are aware of threat for unsustainable fishing practices*

Strategic Action 9.1.1

Implement a Sustainable Fisheries Campaign

Action Step #1

Develop a PSA on unsustainable fishing practices

Action Step #2

Develop a public brochure on these and more sustainable practices as well as rules that apply to fishing

Action Step #3

Conduct outreach & education activities along rivers for local fishermen

**Objective 9.2**

*By 2018, 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

10) The following strategic actions and action steps have been identified for Objectives 10.1, 10.2 and 10.3 to address threats from smuggling:

**Threat 9. Pollution & Threat 4. Transportation: Smuggling**

**Objective 10.1**

*By 2018, general public and agency stakeholders are aware of threats from smuggling (pollution and related transportation impacts to the river)*

Strategic Action 10.1.1

Implement an Awareness program

Action Step #1

Encourage media reporting of the issue and bring more attention to what is happening in the border areas

Action Step #2

Develop PSA and conduct outreach activities in the border areas to raise awareness

**Objective 10.2**

*By 2020, locals have economic alternatives to smuggling*

Strategic Action 10.2.1

Develop socio-economic options for local people in the border regions

Action Step #1

Develop socio-economic pilot projects (e.g. eco-tourism projects such as horse-back riding programs, mountaineering programs, etc.)

**Objective 10.3**

*By 2025, smuggling threats are subject to greater controls*

Strategic Action 10.3.1

Develop more cross-border cooperation between NGOs & authorities working in the border zones

Action Step #1

Develop joint campaign on border environment with Iranian NGOs

Action Step #2

Through Iranian NGOs develop more opportunities for dialogue about border smuggling with Iranian and

<i>Action Step #3</i>	KRG authorities Develop strong ties and help build capacity of border and forestry police to control environmental impacts related to smuggling
-----------------------	--

**11) The following strategic actions and action steps have been identified for Objectives 11.1 and 11.2 to address threats from animal grazing and farms animals degrading river quality:**

**Threat 1. Agricultural activities: Animal grazing & access to rivers**

- |                       |  |
|-----------------------|--|
| <b>Objective 11.1</b> | <i>By 2018, local and government stakeholders are aware of the threat from animal grazing and access to rivers</i>   |
|                       | <i>Strategic Action 11.1.1</i>   |
| Action Step #1        | Research and report on this issue to determine the extent of the problem   |
| Action Step #2        | 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 #3        | Develop a PSA/brochure on best practices for farmers and related stakeholders  |
|                       | Conduct outreach to the College of Agriculture, Animal Science programs to build capacity and understanding on this issues                                     |
| <b>Objective 11.2</b> | <i>By 2025, access to and grazing in the riparian areas by domestic animals now restricted</i>   |
|                       | <i>Strategic Action 11.2.1</i>   |
| Action Step #1        | Build legislative/ regulatory framework to address this issues   |
| Action Step #2        | Examine current framework and identify gaps that should be filled  |
| Action Step #3        | Lobby for rules and regulatory changes and updates   |
|                       | Build capacity for enforcement   |

**12) The following strategic actions and action steps have been identified for Objectives 12.1 and 12.2 to address threats from small holder farms:**

**Threat 1. Agriculture: Small Holder farms (annual, perennial, non-timber, vegetable farming)**

- |                       |  |
|-----------------------|--|
| <b>Objective 12.1</b> | <i>By 2020, local and government stakeholders aware of threats from small holder farm encroachment on Iraqi waterways</i>                                      |
|                       | <u><i>Strategic Action 12.1.1</i></u>  |
| Action Step #1        | <u><i>Research and report on this issue to determine the extent of the problem</i></u>   |
| Action Step #2        | 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 #3        | Develop a PSA/brochure on best practices for farmers and related stakeholders  |
|                       | Conduct outreach to the College of Agriculture, Animal Science programs to build capacity and understanding on this issues                                     |
| <b>Objective 12.2</b> | <i>By 2025, clearance of land along streams and riverways is subject to stronger controls</i>  |
|                       | <u><i>Strategic Action 12.2.1</i></u>  |
| Action Step #1        | <u><i>Build legislatives/ regulatory framework to address this issues</i></u>  |
|                       | 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

**13) The following strategic actions and action steps have been identified for Objectives 13.1 and 13.2 to address threats from general agro-chemical pollution:**

**Threat 9. Pollution: Agro-Chemical pollution**

**Objective 13.1** *By 2020, farmers and local government stakeholders aware of threats from agricultural pollution (herbicide, pesticide, animal waste and sediment runoff)*

Strategic Action 13.1.1 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 this issues

**Objective 13.2** *By 2025, agricultural Pollution to streams and waterways is subject to stronger controls*

Strategic Action 13.2.1 Build legislatives/regulatory framework to address this 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



## Acknowledgements

We would like to thank the following individuals for their contribution to this work. This included Nabil Musa and Nwenar Fatih, the former and current Iraq Upper Tigris Waterkeeper and Mustafa Juma'a, from the Suliamani Environment Directorate who conducted the Lesser Zab Threat Assessment Field Work. We also wish to recognize the contribution of GIS Maps by Dr. Sinan Abood of the Institute of Terrestrial Ecosystems Applied Ecology & Conservation at ETH-Zurich in Zurich, Switzerland.

## References

- BirdLife International (2006) *Monitoring Important Bird Areas: a global framework*. Cambridge, UK. BirdLife International. Version 1.2. Compiled by Leon Bennun, Ian Burfield, Lincoln Fishpool, Szabolcs Nagy & Alison Stattersfield.
- Ali, M.H. (no date). "Transboundary waterways and streams along the Iraq-Iran border line... the reality and the future" Baghdad University. College of Sciences. Retrieved on 28 January, 2012 from [http://park.itc.u-tokyo.ac.jp/ggwater/tia\\_project/intlmeet/et\\_exp\\_meet3\\_oct05/ali\\_iraq\\_iran.pdf](http://park.itc.u-tokyo.ac.jp/ggwater/tia_project/intlmeet/et_exp_meet3_oct05/ali_iraq_iran.pdf)
- SELKHOZPROM EXPORT. (1982) "General Scheme of Water Resources and Land Development in Iraq, Volume IV".

## Annex 1: Reach List

REACH #	Reach Name	START_GPS_N	START_GPS_E	END_GPS_N	END_GPS_E
1	Shabadin-Talun to Marwe Village (Mashan)	35.9548	45.61608	35.98516	45.5649
2	Mashan from Marwe Village (Mashan) to Awakurte Dashty Khane	35.98516	45.5649	35.99007	45.43278
3	Awa Kurte Dashti Khane Village to Du-Choman in Mawat	35.99007	45.43278	35.96868	45.39623
4	Mishaw Marz to Qokhalal	35.81657	46.3364	35.74483	46.15085
5	Qokhalal to Suraban bridge	35.74483	46.15085	35.74199	45.76494
6	Halalawa Village to Suraban Bridge	35.65114	46.00577	35.7419	45.76494
7	Suraban Bridge to Mokaba Village	35.74199	45.76494	35.75802	45.43194
8	Tutman Chamy Gawra to Tankabwar Bridge	35.51973	45.99267	35.68439	45.64278
9	Tankabwar Bridge to Qalachwalan Bridge	35.68439	45.64278	35.69665	45.54229
10	Qalachwalan Bridge to Kunamasi	35.69665	45.54229	35.79735	45.41816
11	Kunamasi to Du-Choman in Mawat	35.79735	45.41816	35.96868	45.39623
12	Waysi Bridge to Kewe Village	36.00667	45.33769	36.11526	45.17468
13	Kewe Village to Darband near Raniya lake	36.11526	45.17468	36.197522	44.944102
14	Sura Gulla Village- Qandil to Zharawa-Lesser Zab	36.3845	45.17906	36.19708	45.04889
15	Qarnaqaw Qandil to Sangasar Lesser zab	36.45118	45.01308	36.22128	44.9868
16	Dukan Dam to Fish Hatchery	35.9488	44.95528	35.89587	44.97514
17	Fish Hatchery to Surqawshan Gravel Mine	35.89587	44.97514	35.87506	44.93928
18	Surqawshan gravel mine to Bogd Village Bulqamish gravel mine	35.87506	44.93928	35.88966	44.85114
19	Bogd Village Bulqamish Gravel Mine to Goptapa-Rana Rwtā Gravel Mine	35.88966	44.85114	35.86792	44.85859
20	Goptapa - Rana Rwtā Gravel Mine to Kani Hanjir - Mam Bakir Gravel Mine	35.86792	44.85459	35.86859	44.80872
21	Kani Hanjir - Mam Bakir Gravel Mine to Taq Taq Bridge	35.86792	44.85859	35.88092	44.58459
22	Taq Taq Bridge to Dibis Bridge	35.88092	44.58459	35.68826	44.0667
23	Dibis Bridge to Shag village	35.68826	44.0667	35.14268	43.254303

## Annex 2: Specific Threats

Threat Category	Reach Name	Threat name	Latitude	Longitude	Threat Status Score
1. Agricultural expansion & intensification	Qokhalal/Mishaw to Suraban bridge	Farming - small farms	35.70547	46.0884	-2 High
1. Agricultural expansion & intensification	Dibis Bridge to Shag village	Farming - small farms	35.245773	43.42336	-1 Medium
1. Agricultural expansion & intensification	Sarganil village to Kwrtaq	Farming - small farms	36.36093	44.99158	-1 Medium
1. Agricultural expansion & intensification	Surqawshan gravel mine to Bogd Village Bulqamish gravel mine	Fish farming	35.89664	44.86077	0 Low
1. Agricultural expansion & intensification	Dibis Bridge to Shag village	Farming - small farms	35.191168	43.345698	0 Low
1. Agricultural expansion & intensification	Sarganil village to Kwrtaq	Farming - small farms	36.40053	45.00949	0 Low
1. Agricultural expansion & intensification	Sarganil village to Kwrtaq	Farming - small farms	36.4108	45.02687	0 Low
1. Agricultural expansion & intensification	Sarganil village to Kwrtaq	Farming - small farms	36.43211	45.01653	0 Low
2. Residential & commercial development	Fish Hatchery to Surqawshan Gravel Mine	Refinery	35.879441	44.96734	-2 High
2. Residential & commercial development	Surqawshan gravel mine to Bogd Village Bulqamish gravel mine	Klesa Village	35.88481	44.91032	-1 Medium
3. Energy production & mining	Goptapa - Rana Rwtā Gravel Mine to Kani Hanjir - Mam Bakir Gravel Mine	Gravel mining - Mam Bakir kak Yusuf	35.86859	44.80872	-3 Very High
3. Energy production & mining	Goptapa - Rana Rwtā Gravel Mine to Kani Hanjir - Mam Bakir Gravel Mine	Gravel mining (first)	35.85513	44.84119	-3 Very High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining - 2	35.194351	43.355531	-3 Very High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining - 4	35.251686	43.423824	-3 Very High
3. Energy production & mining	Fish Hatchery to Surqawshan Gravel Mine	Gravel mining - L1 & L2	35.87277	44.94098	-2 High
3. Energy production & mining	Bogd Village Bulqamish Gravel Mine to Goptapa-Rana Rwtā Gravel Mine	Gravel mining - Bulqamish	35.88966	44.85459	-2 High
3. Energy production & mining	Bogd Village Bulqamish Gravel Mine to Goptapa-Rana Rwtā Gravel Mine	Gravel mining - Dawlat Yar	35.86561	44.85908	-2 High
3. Energy production & mining	Bogd Village Bulqamish Gravel Mine to Goptapa-Rana Rwtā Gravel Mine	Gravel mining - Rana Rwtā	35.86792	44.85459	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining	35.42752	43.71917	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining	35.24555	43.41708	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining	35.194027	43.36066	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining	35.232848	43.405963	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining - 2	35.19953	43.35005	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining - 3	35.142787	43.26572	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining - 5 (reaching 500 meters)	35.43117	43.72151	-2 High

Threat Category	Reach Name	Threat name	Latitude	Longitude	Threat Status Score
3. Energy production & mining	Kani Hanjir - Mam Bakir Gravel Mine to Taq Taq Bridge	Gravel mining-Kani Hanjeer	35.85002	44.79846	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining	35.234225	43.405814	-2 High
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining - 2	35.163127	43.314267	-2 High
3. Energy production & mining	Kunamasi to Du-Choman in Mawat	Gravel mining	35.86267	45.41661	-1 Medium
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining	35.253999	43.4336	-1 Medium
3. Energy production & mining	Dibis Bridge to Shag village	Gravel mining	35.235295	43.41145	-1 Medium
3. Energy production & mining	Dukan Dam to Fish Hatchery	Gravel mining-small	35.8997	44.98018	0 Low
3. Energy production & mining	Surqawshan gravel mine to Bogd Village Bulqamish gravel mine	Gravel mining - Kani Bee-Bulqamish	35.88966	44.85114	0 Low
3. Energy production & mining	Waysi Bridge to Kewe Village	Gravel mining	36.11526	45.174768	0 Low
4. Transportation & service corridors	Surqawshan gravel mine to Bogd Village Bulqamish gravel mine	Klesa Village roads	35.87594	44.92934	0 Low
4. Transportation & service corridors	Kunamasi to Du-Choman in Mawat	road crossing river	35.92497	45.36171	0 Low
4. Transportation & service corridors	Dibis Bridge to Shag village	Bridge crossing	35.251678	43.425647	0 Low
4. Transportation & service corridors	Dibis Bridge to Shag village	Shmet Bridge	35.163127	43.314267	0 Low
4. Transportation & service corridors	Sarganil village to Kwrtak	Bridge	36.40166	45.01046	0 Low
4. Transportation & service corridors	Sarganil village to Kwrtak	Bridge	36.4108	45.02687	0 Low
6. Human intrusions & disturbance	Sarganil village to Kwrtak	Villages and towns	36.4108	45.02687	-2 High
6. Human intrusions & disturbance	Tutman Chamy Gawra to Tankabwar Bridge	Work & other activities	35.56151	45.938	-1 Medium
6. Human intrusions & disturbance	Sarganil village to Kwrtak	Villages and towns	36.35294	44.99496	-1 Medium
7. Natural system modifications	Fish Hatchery to Surqawshan Gravel Mine	Sediment-loaded stream from gravel mine and heavy rains	35.89304	44.974644	-2 High
7. Natural system modifications	Dukan Dam to Fish Hatchery	Dam & water management	35.9488	44.95528	-2 High
7. Natural system modifications	Waysi Bridge to Kewe Village	Dams and water management (proposed dam)	36.10199	45.17104	-2 High
7. Natural system modifications	Surqawshan gravel mine to Bogd Village Bulqamish gravel mine	Dams and water management - Daw dawa Village	35.89298	44.84904	0 Low
9. Pollution	Dukan Dam to Fish Hatchery	Sewage from wastewater pipes and sewage box	35.93137	44.95992	-2 High
9. Pollution	Halalawa Village to Suraban Bridge	Garbage and waste from villages	35.64376	45.93923	-1 Medium
9. Pollution	Qokhalal/Mishaw to Suraban bridge	Sewage & waste water from villages	35.76097	45.99244	-1 Medium
9. Pollution	Tankabwar Bridge to Qalachwalan Bridge	Garbage and waste from villages	35.69728	45.54229	0 Low
9. Pollution	Kunamasi to Du-Choman in Mawat	Garbage and waste	35.8426	45.42974	0 Low
9. Pollution	Sarganil village to Kwrtak	Garbage and waste from villages	36.36093	44.99158	0 Low



## 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 Program and about Nature Iraq. We welcome new members, volunteers and interns.

Contact the **Waterkeepers Iraq** program at:

[waterkeeper@natureiraq.org](mailto:waterkeeper@natureiraq.org)

+964 (0) 7704616371

[www.iraqwaterkeeper.org](http://www.iraqwaterkeeper.org)



پاریزهرانی ئاو عیراق

WATERKEEPERS IRAQ

المحافظین علی المیاء العیراق

Nature Iraq  
[info@natureiraq.org](mailto:info@natureiraq.org)  
[www.natureiraq.org](http://www.natureiraq.org)



Waterkeepers Iraq is affiliated with the international **Waterkeeper Alliance**



This work was generously funded by the **Rufford Small Grants Fund**

