The Effect of Operation of Mosul Dam on Sediment Transport in its Reservoir

Issa ISSA\textsuperscript{1}, Nadhir AL-ANSARI\textsuperscript{2}, Seven KNUTSSON\textsuperscript{3}

\textsuperscript{1,2,3}Lulea University of Technology, Sweden

Moayad KHALEEL\textsuperscript{4}

\textsuperscript{4}Mosul University, Mosul, Iraq
I. INTRODUCTION

Mosul dam

Tigris

Euphrates

Baghdad

IRAN

TURKEY

SYRIA

JORDAN

IRAQ

SAUDI ARABIA

KUWAIT

Gulf
II. THE STUDY AREA

Mosul dam

80 km

60 km
II. THE STUDY AREA

- 338 m W. L. (PMF)
- 335 m (1000 Year flood)
- 330 m Max. operation level (11.1 * 109 m³ storage)
- 8.16 * 109 m³ usable active storage for irrigation and power.
- 300 m Min. operation level (2.95 * 106 m³ storage)
- 236 m Bed level

- 341 m Crest level
- 10 m
- 113 m

Earth fill shell

Clay core
II. THE STUDY AREA

Mosul dam
Mosul dam aerial picture.jpg
RGB
Red: Band_1
Green: Band_2
Blue: Band_3
0 9,000 18,000 27,000

Tigris River
Mosul reservoir
Dam site

2 km
45 km
14 km
III. EXPERIMENTAL INVESTIGATION

1. The physical hydraulic model
1. The physical hydraulic model

Date of construction 2010

Horizontal scale ratio = 1:1000

Vertical scale ratio = 1:100
III. EXPERIMENTAL INVESTIGATION

1. The physical hydraulic model

1- Earth tank.
2- Suction pipe.
3- Pump.
4- Valve.
5- Downstream sump.
6- Delivery pipe.
7- Return pipe.
8- Downstream sluice gate.
9- Measuring carriage.
10- Sediment feeder.
11- Point gage.
12- Upstream tank.
13- Upstream sluice gate.
14- Strainer.
15- Overflow pipe.

All dimensions in the sketch are (m)

Figure 2: Schematic diagram of the physical model
III. EXPERIMENTAL INVESTIGATION

1. The physical hydraulic model

- Tigris River
- Measurement section
- Mosul reservoir
- Dam site
### III. EXPERIMENTAL INVESTIGATION

#### 2. The Experiments

\[ q_s = \frac{w}{T} \]

<table>
<thead>
<tr>
<th>Discharge in model (lps)</th>
<th>0.5</th>
<th>1.0</th>
<th>1.5</th>
<th>2.0</th>
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</thead>
<tbody>
<tr>
<td>Discharge in prototype (m³/sec)</td>
<td>500</td>
<td>1000</td>
<td>1500</td>
<td>2000</td>
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<tr>
<td>Water level in prototype (MSL)</td>
<td>Bedload at Sec. (1) (g/sec)</td>
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<td>305</td>
<td>3.848</td>
<td>9.143</td>
<td>13.571</td>
<td>17.22</td>
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<tr>
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<td>8.695</td>
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<td>11.636</td>
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<td>0.0001</td>
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IV. RESULTS AND DISCUSSION

1. Impact of water level on the bed-load rate

2. Impact of upstream water discharge on the bed-load rate
## IV. RESULTS AND DISCUSSION

\[
q_{sd} = \left( \frac{q_s^{305} - q_{s,i}}{q_s^{305}} \right) \times 100
\]

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<td>1000</td>
<td>1500</td>
<td>2000</td>
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<tr>
<td>Water level in prototype (MSL)</td>
<td>Percentage bedload deposited % at Sec.1</td>
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<td>0</td>
<td>0</td>
<td>0</td>
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<tr>
<td>307</td>
<td>1.6</td>
<td>5</td>
<td>5.35</td>
<td>7</td>
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<tr>
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<td>11.2</td>
<td>20.8</td>
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<td>55.8</td>
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<td>99.998</td>
<td>99.998</td>
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<td>99.995</td>
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</tbody>
</table>
IV. RESULTS AND DISCUSSION

% bedload deposited

Qm=0.5 lps
Qm=1.0 lps
Qm=1.5 lps
Qm=2.0 lps

Water stage (MSL)
V. CONCLUSION

• Sediment transport rate is directly related to the water stage.

• The physical model can be used for future prediction of bed-load rate within that area. It can be used as a guide for operation rules.

• The increase of out flow from reservoir without any increase of the inflow from the River Tigris causes an increase in sediment transport rate entering the reservoir.
• Keeping the water level within the reservoir during the flood period as high as possible will reduce the amount of sediment entering the reservoir.