Jun 21st, 3:15 PM - 3:30 PM

Case Studies III: Rehabilitation of the Yarqon River, a Mediterranean Climate Polluted Stream Ecosystem, and the Reintroduction of the Yarqon Bleak - an Israeli Endemic Critically Endangered Freshwater Cyprinid Fish

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Raz, Yonathan, "Case Studies III: Rehabilitation of the Yarqon River, a Mediterranean Climate Polluted Stream Ecosystem, and the Reintroduction of the Yarqon Bleak - an Israeli Endemic Critically Endangered Freshwater Cyprinid Fish" (2016). International Conference on Engineering and Ecohydrology for Fish Passage. 7.
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Rehabilitation of the Yarqon river, a Mediterranean Climate polluted stream Ecosystem, and the reintroduction of the Yarqon bleak- an Israeli endemic critically endangered freshwater cyprinid fish

Yonathan raz
ISRAEL
The Yarqon River basin - a catchment area of 1,800 km²

The site where the Israelites are said to have crossed over into the Promised Land. Also where John the Baptist baptized Jesus.
Yarkon Basin - Elevations

Legend

- PA border
- Elevation (m)
  - High: 1006
  - Low: 3

The Remote Sensing Laboratory
Jacob Blaustein Institutes for Desert Research
Ben Gurion University of the Negev
10 miles

Tel Aviv

perennial

Meanders along 18 miles

intermittent catchment area

1,800 Km²

Jerusalem
Yarqon estuary in Tel Aviv
The yarqon river

1878
20th century

junk & sewage
Wastewater treatment facility flooded with detergents
Detergents in the river, crash of the limnological system
### Percent population growth in the basin (in millions)

<table>
<thead>
<tr>
<th>Year</th>
<th>1989</th>
<th>2014</th>
<th>2040</th>
</tr>
</thead>
<tbody>
<tr>
<td>4%</td>
<td>3%</td>
<td>2%</td>
<td>2014</td>
</tr>
<tr>
<td>2.5</td>
<td>2.5</td>
<td>2.5</td>
<td></td>
</tr>
<tr>
<td>6.7</td>
<td>5.2</td>
<td>4.1</td>
<td>2040</td>
</tr>
</tbody>
</table>

*According to the Administration's data, growth today is approximately 2.2%*

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The Yarkon basin – comparing urbanization 1989-2014-2040 and predictable population growth

West of the green line in 2014 expected 1.8 million people.

West of the green line in 2040 expected 3.5 million.
Yarqon rehabilitation project - overview
Yarqon rehabilitation project - overview

Springs

Constructed wetland

WWTP

For agriculture and park irrigation

From 6-25K to 0, now 1.4K m³/h
BOD & ammonia reduction in the mid reach of the yarqon river

Ammonia NH$_4$ as N

tertiary WWT start 2009
remaindering
river bank collapse
trees in danger
Constructed wetland
By 2016 Desalination supply 100% of domestic water consumption
Yarqon bleak - an Israeli endemic critically endangered freshwater cyprinid fish

*Acanthobrama telavivensis*

5/32 of native species extinct – 16%
6/32 critically endangered – 19%
The distribution of the Yarqon bleak in the 1960s (red ovals) and in 1999 (asterisk). Pink ovals indicate heavily polluted rivers in which the fish probably occurred until 1950s.
Over use of aquifer and the river source went dry

Only 150 fish rescued
The facility for maintaining - breeding the fish (Ichthyological Laboratory at Tel Aviv University)

- No. of fish in tank: 1
- Spawning temperature: 2
- Spawning substrate: 3
- Fish diet: 4

In 5 years – 14,000 fish
The engineered bottom of the experimental side pond near Yarqon River
engineered Spawning pond

Screen net
engineered spawning pond

Nymphaea caerulea
Blue Water-Lily
distribution of fish species at the headwaters/spring, 2014 survey

- Acanthobrama telavivensis: 68
- Tilapia zilli: 11
- Gambusia affinis: 19
- Clarias gariepinus: 1.4
distribution of fish species at lower part of upper reach, 2014 survey

- Acanthobrama telavivensis: 0.4
- Tilapia zilli: 35
- Cyprinus carpio: 17
- Gambusia affinis: 2
- Clarias gariepinus: 46
To save the endangered Yarqon bleak - raise public awareness – support of decision-makers.

Breeding facility & river rehabilitation – water allocation, habitat for spawning and juveniles shelter.
Thank you

Nymphaea caerulea
Blue Water-Lily