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Some Proven Benefits of Polymer Use in the Treatment of Sediments in Recent Dredging Projects

by

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Introduction

Coagulation and flocculation basics

Port La Foret harbour (France) case study

Kishon river (Israel) case study

Conclusion

Questions and Answers



*A brief history
of polymer
use in the
dredging
industry*

2000 – strong increase in polymer usage in dredging

Better

Faster

Smaller



WODCON XXI

SNF FLOERGER

1.5 Mt/y

Water

50 Years

Oil & Gas

Safe

Mining

Agriculture

Paper

Textile

Cosmetics

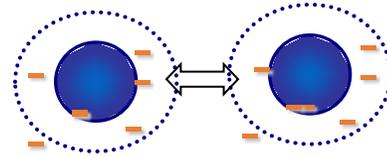
*Use of
polyelectrolytes*

*What do
polyelectrolytes
do ?*

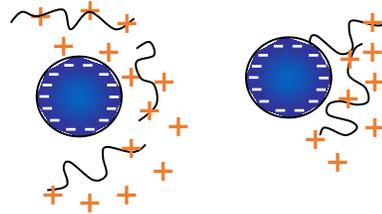


Destabilisation of the constituents of a given water

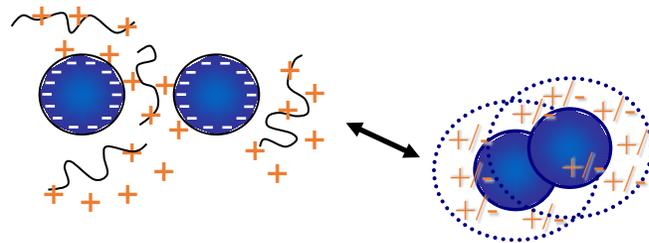
Stable colloids



Unstable colloids

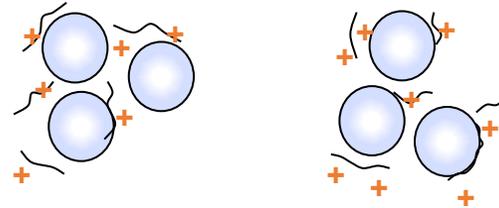


Micro flocs formation

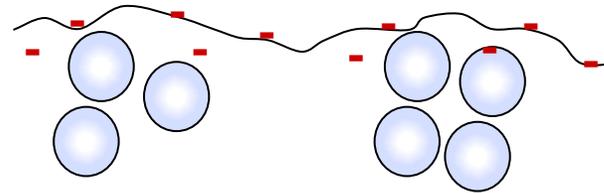


Collection into aggregates

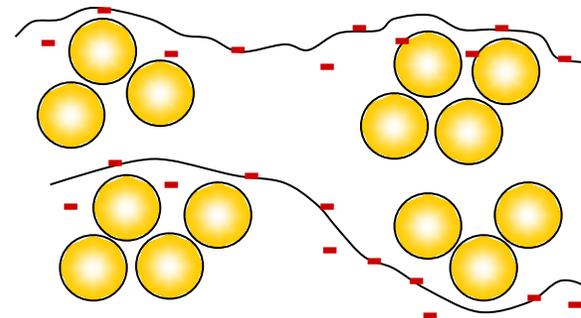
Micro flocs and unstable colloids



Bridging effect



Flocs formation

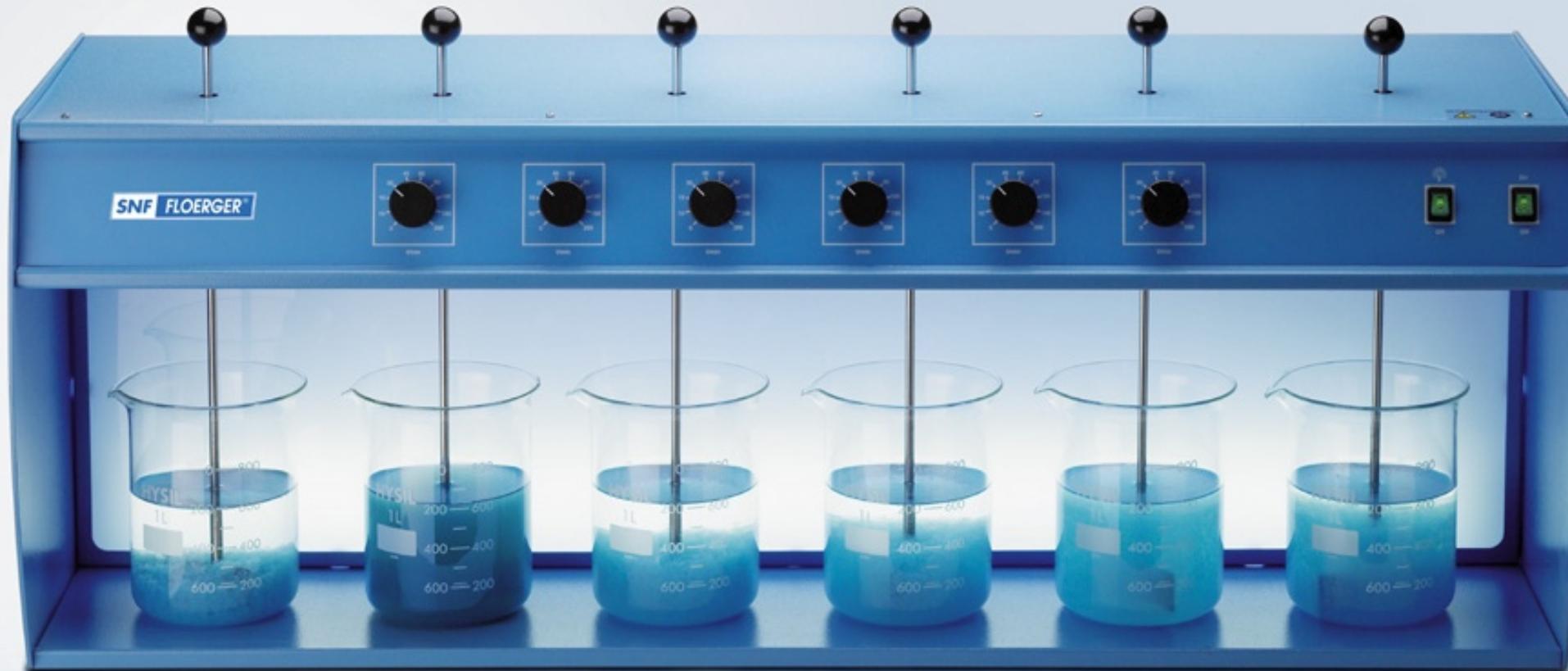


Particle diameter		Type of particle	Settling time through 1m of water
mm	µm		
10	10 ⁴	Gravel	1 second
1	10 ³	Sand	10 seconds
10 ⁻¹	10 ²	Fine sand	2 minutes
10 ⁻²	10	Clay	2 hours
10 ⁻³	1	Bacteria	8 days
10 ⁻⁴	10 ⁻¹	Colloid	2 years
10 ⁻⁵	10 ⁻²	Colloid	10 years
10 ⁻⁶	10 ⁻³	Colloid	200 years



On site Laboratory Selection Test Parameters

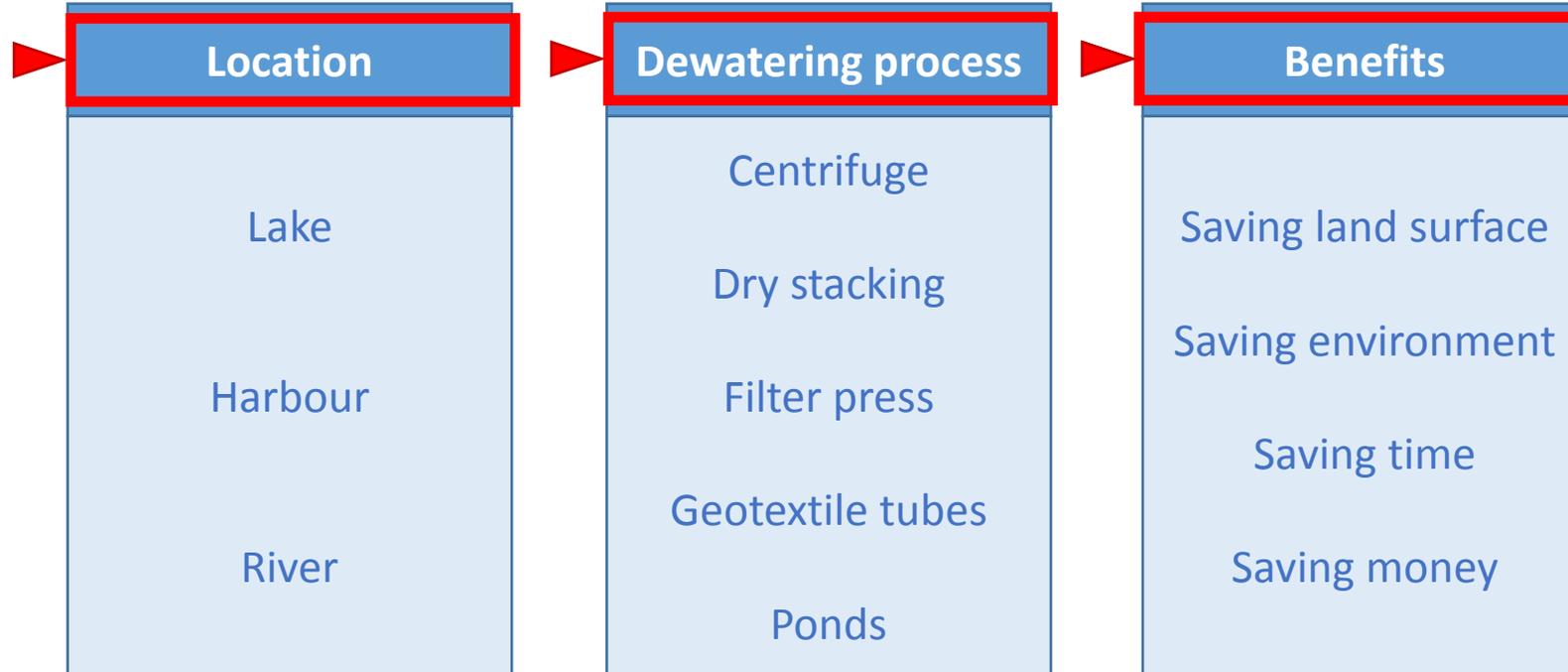
- variability of dredged sediments
- type of dewatering equipment
- type of water and equipment for polymer preparation
- environmental aspects
- ...



Jar Test

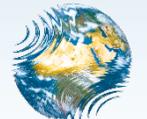
Port-La-Forêt Harbour

*Port-La-Forêt
Harbour*

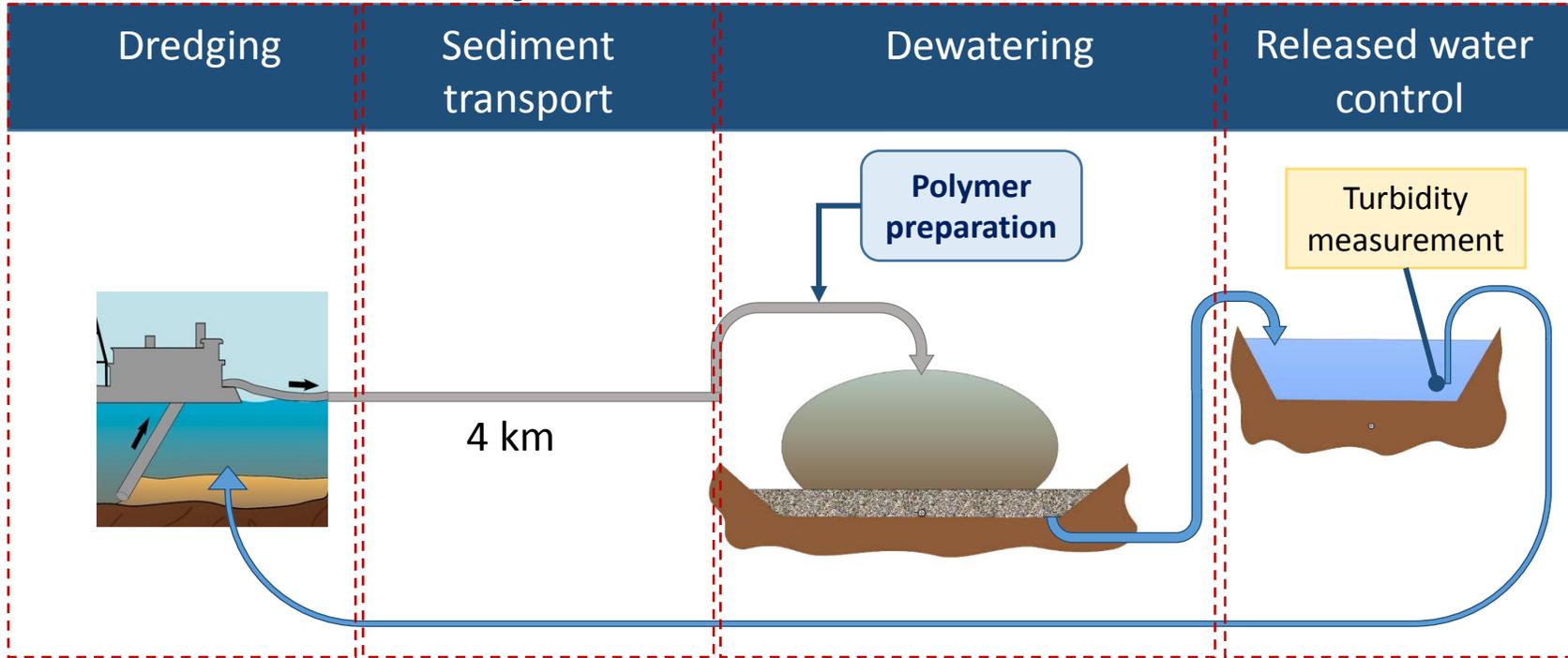


Overview of the Project

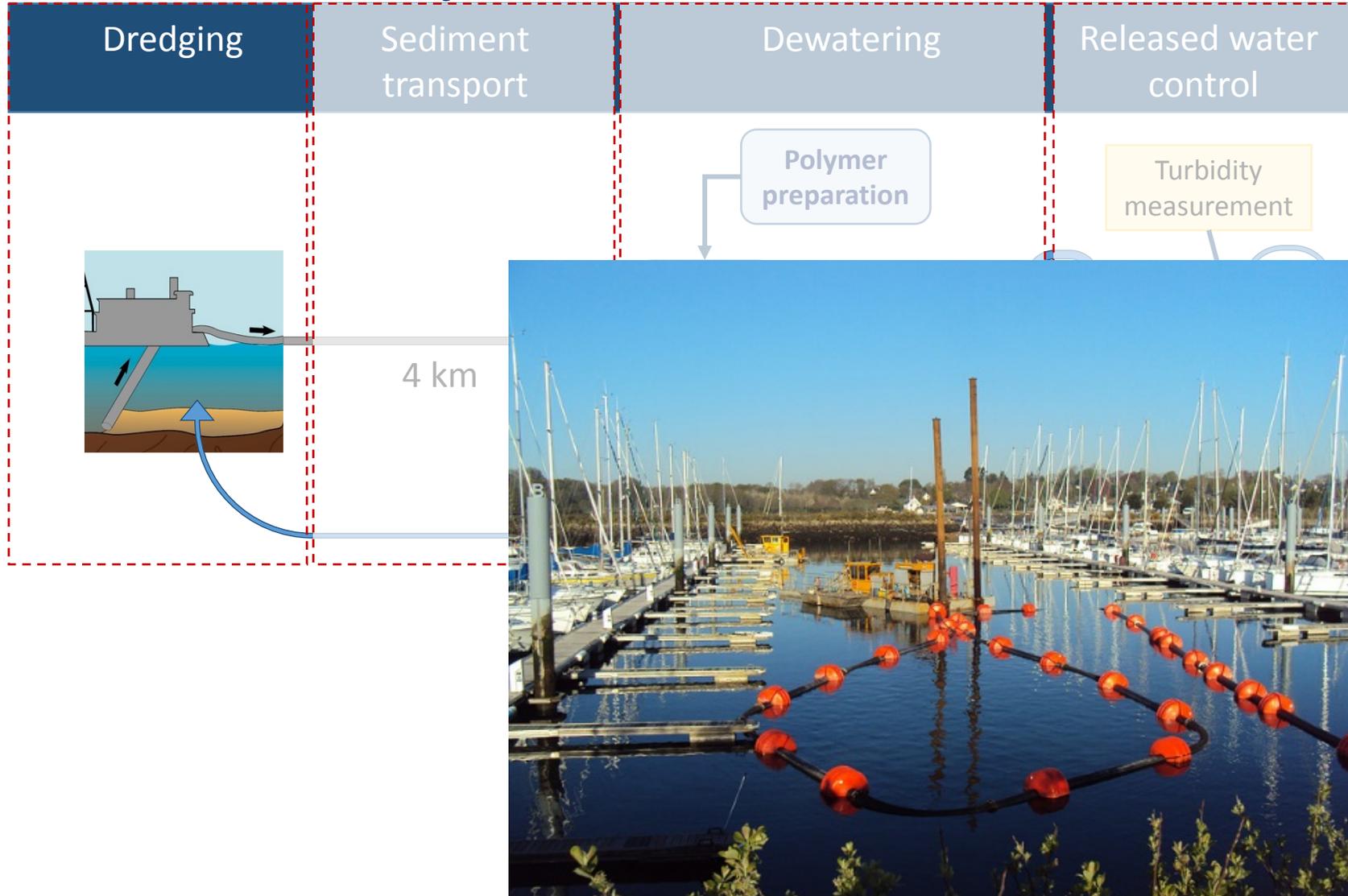
- Date: 2013
- Location: Brittany, France
- Sediment volume: 40.000 m³
- Sediment data: slightly polluted (paint residues)
- Key players:
 - Port authorities (SAEM SODEFY)
 - Port-La-Forêt municipality
 - Environmental agency (DREAL, Police de l'eau)
- Others: no harbour maintenance for several years



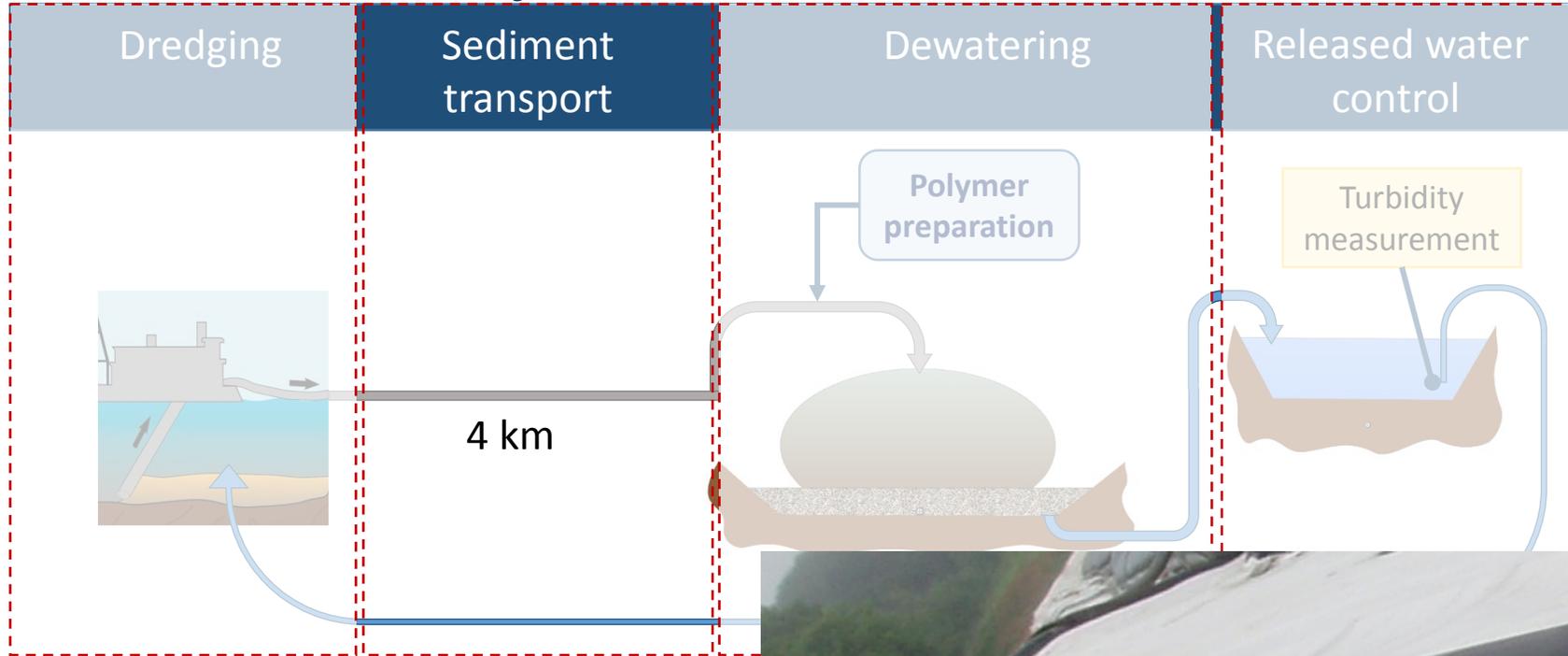
Overview of the Project



Overview of the Project



Overview of the Project:



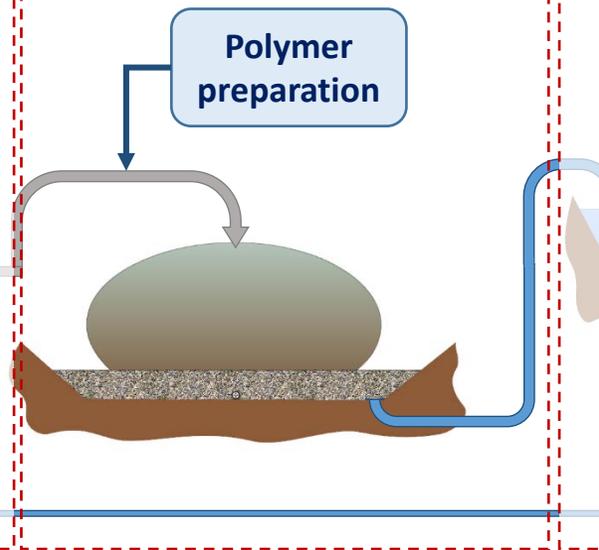


Port-la-Forêt

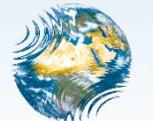
Overview of the Project



Polymer injection point



Sampling point



Overview of the Project

Dredging

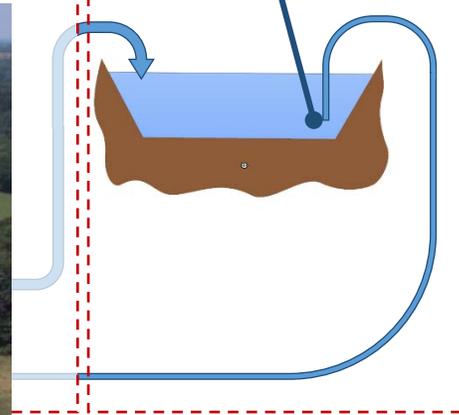
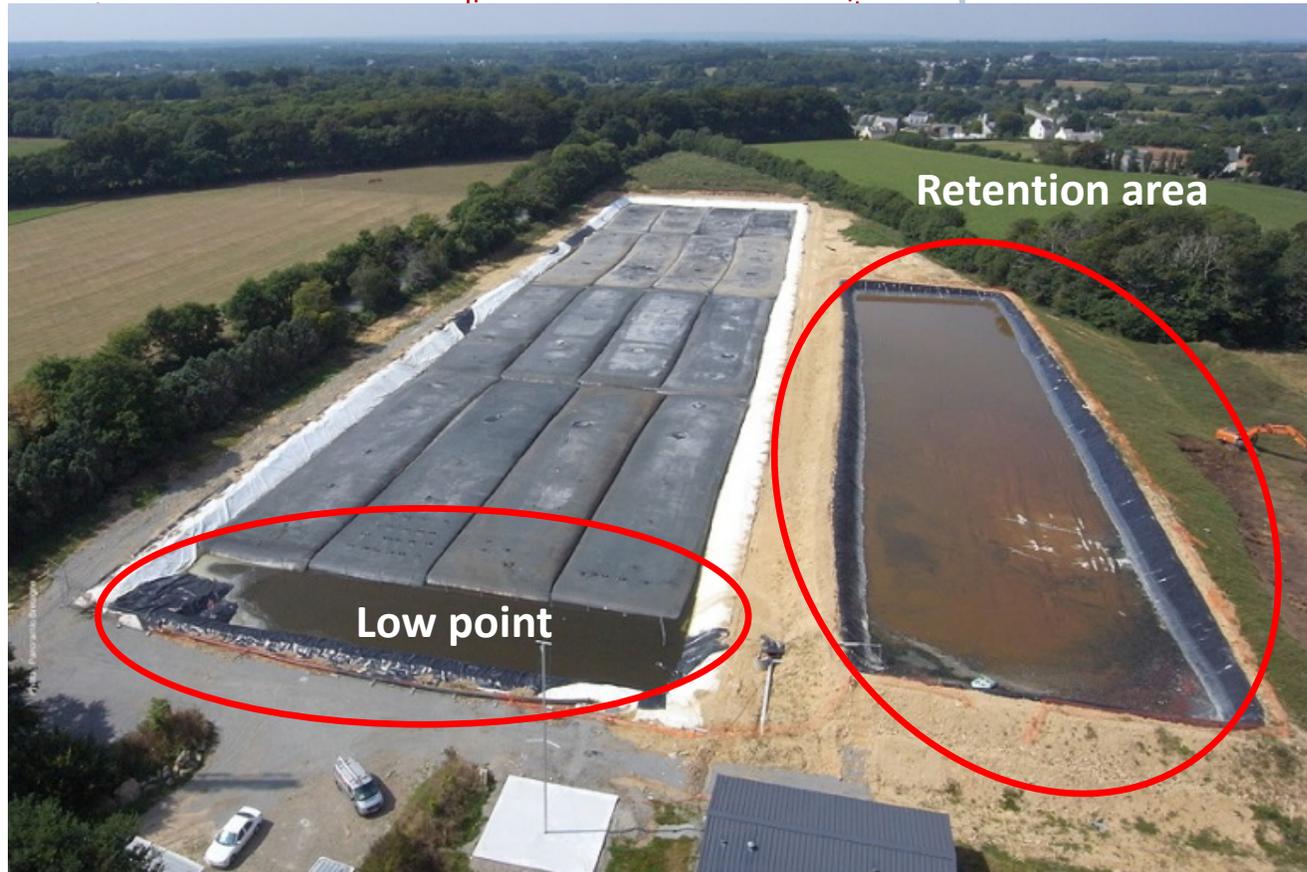
Sediment transport

Dewatering

Released water control

Polymer preparation

Turbidity measurement



*Port-La-Forêt
Harbour*

Project Review

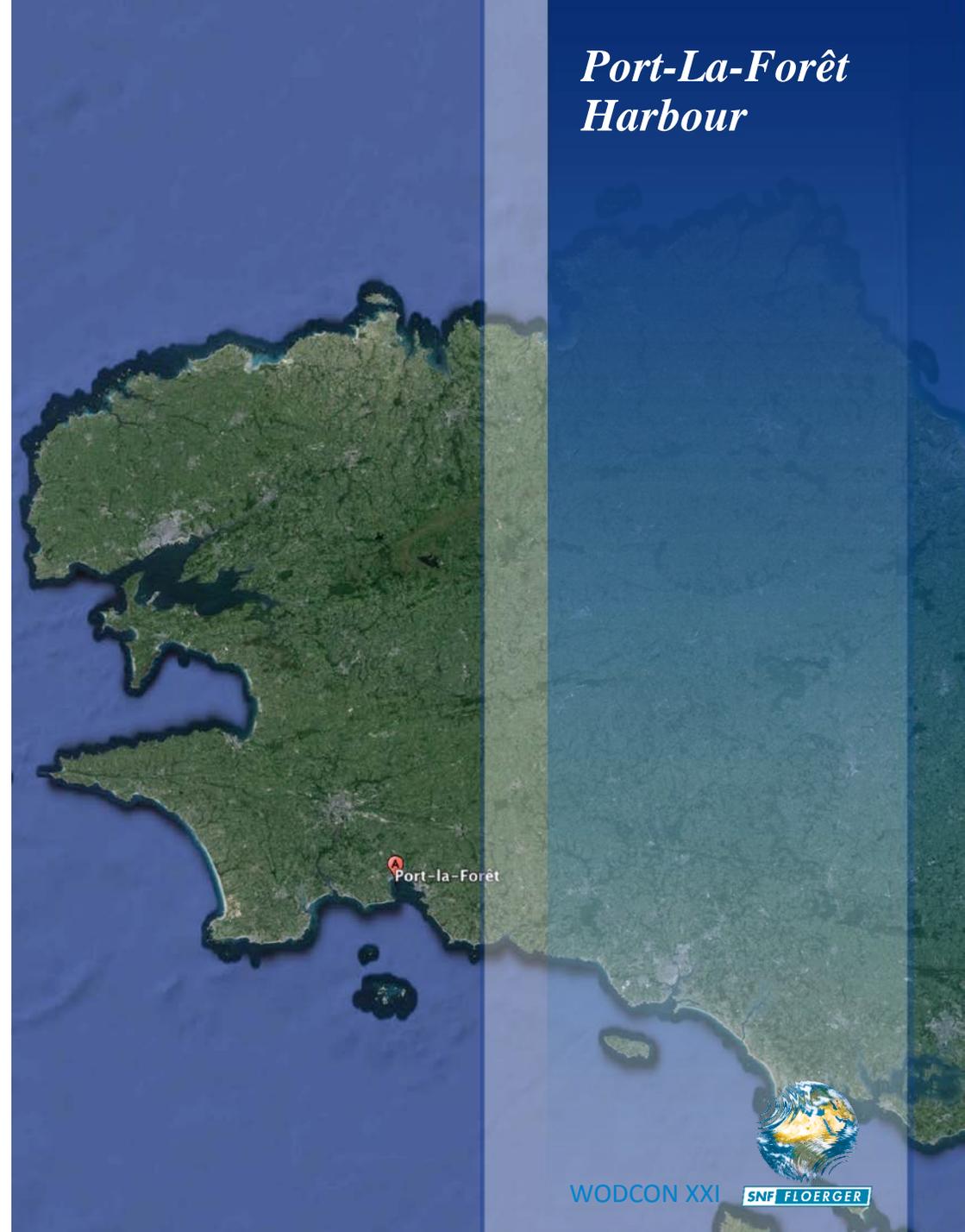
Key points:

- Duration: 6 months
- Dredged sediments: 40.000 m³
- Flocculant: high cationic branched polymer
- Polymer consumption 15 metric tonnes

Project benefits:

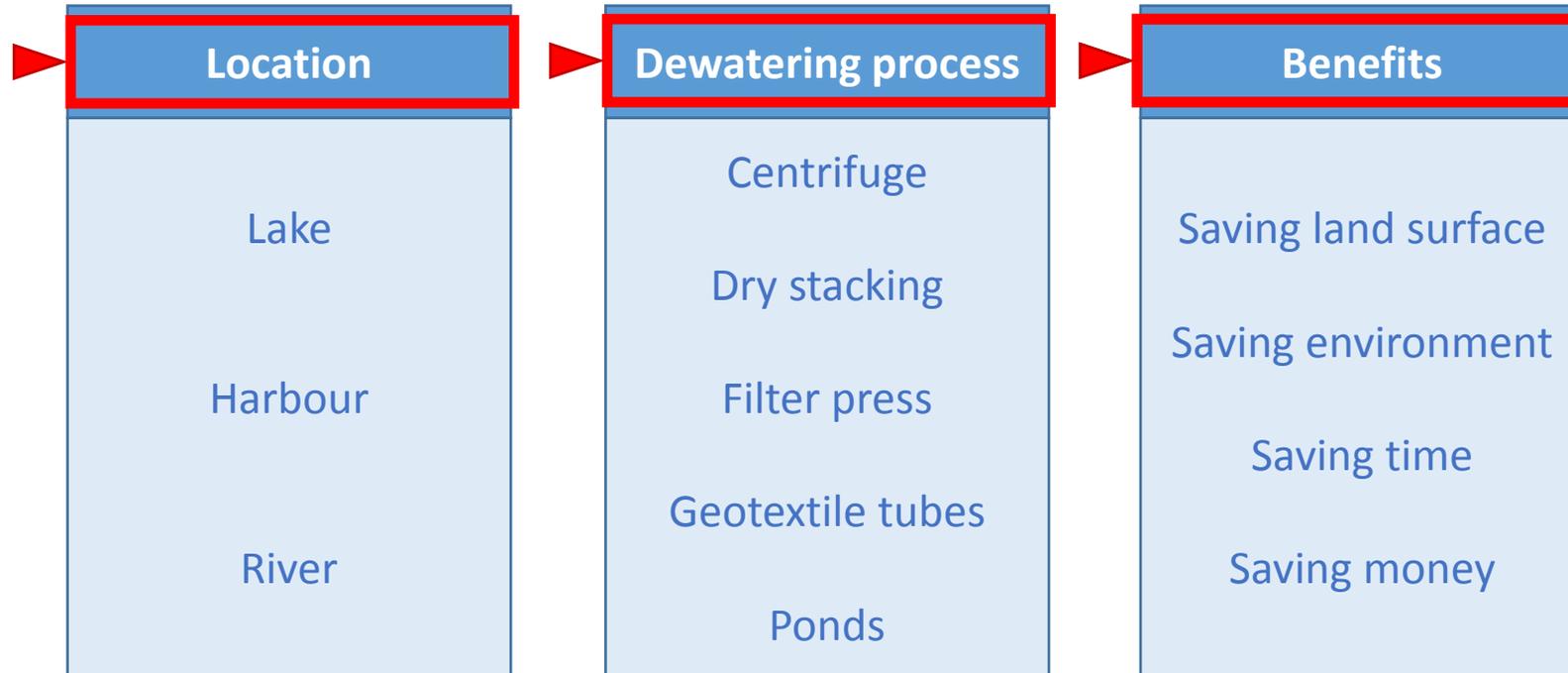
- Increasing harbour level for harbour boaters
- Removing contaminated sediment to a safe area
- Saving use of turnround of around 3000 trucks

*Port-La-Forêt
Harbour*



Kishon River

Kishon River

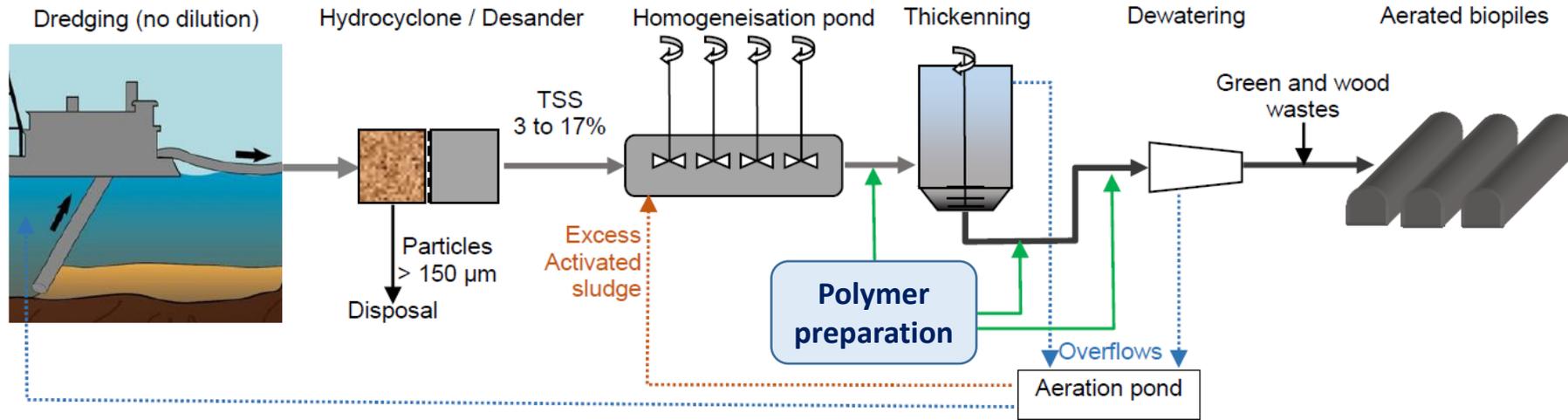


Overview of the Project

- Date: 2014-2016
- Location: Haifa, Israel
- Sediment volume: 400.000 m³
- Sediment data: strong pollution (Heavy metals, hydrocarbons, ...)
- Key players:
 - Israeli government
 - Kishon river and Drainage Authority
 - Water Authority
 - Manufacturers Association
 - Environmental umbrella organization (Life and Environment)
 - Local Authorities
- Others: cleaning 7 kilometers downstream



Process Description



Polymer Preparation Unit

Project Review

Key points

- Duration 28 months
- Dredged sediments 400.000 m³
- Flocculant Very high Molecular Weight, medium anionic linear polymer
- Polymer consumption around 120 t

Project benefits

- Revitalization of the river
- Flood prevention
- Sediment depollution



Kishon River

Solid-liquid separation is the main benefit of polymers in these case studies

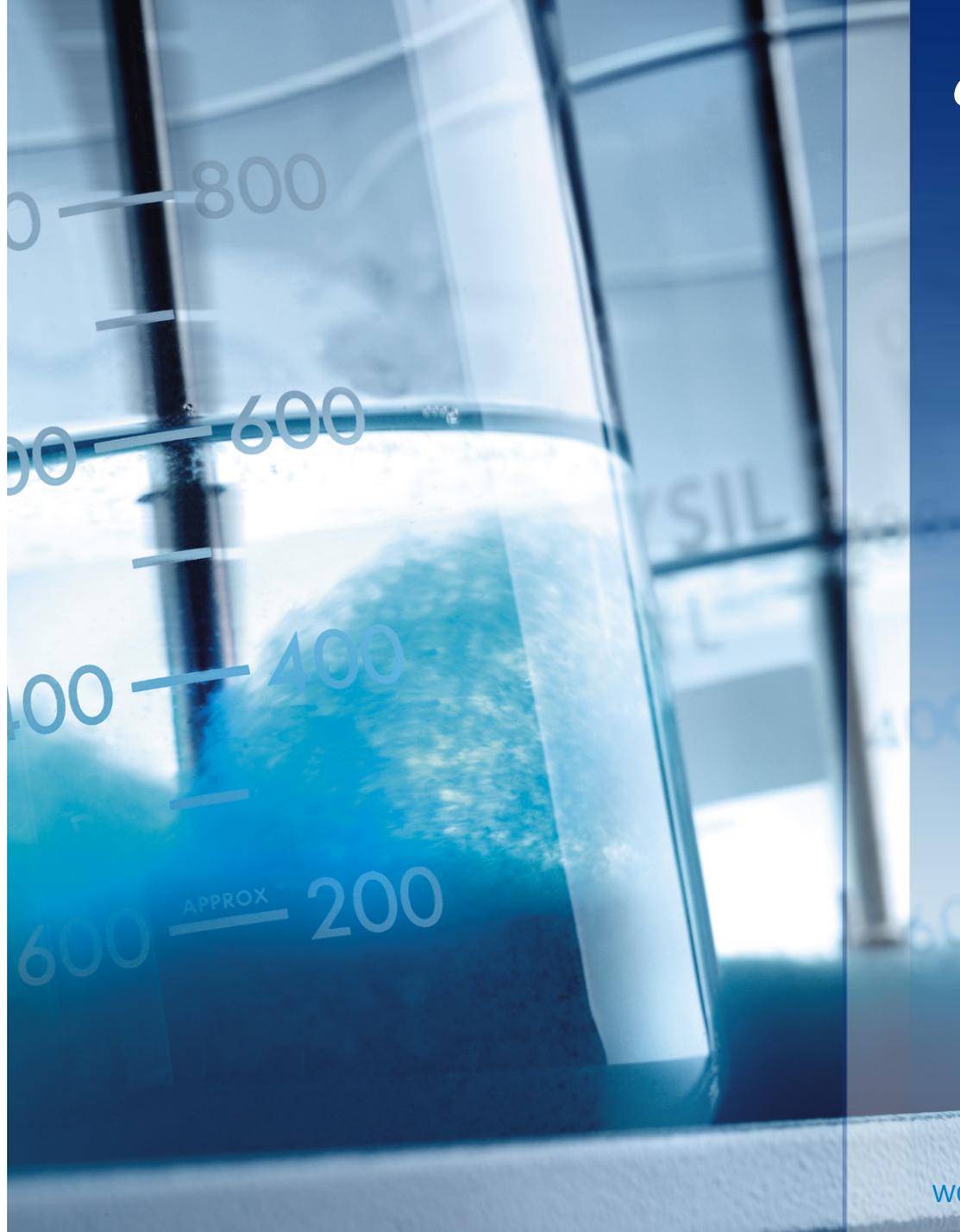
Other proven benefits

- ✓ Decrease of pumping cost for **long distance transportation** of mineral particles in water
- ✓ **Low-cost technique** for the treatment of mature fine tailings in Canadian oil sands
- ✓ **Accelerated drainage** for higher machine running rates in paper industry
- ✓ **Decrease of pumping pressure** in fracking jobs
- ✓ **Reduction of cake solids** amount in municipal water treatment
- ✓ **Higher storage** capability in mine tailing ponds



Conclusion

- ✓ In 2016 not all polymer benefits have been transferred to the dredging industry
- ✓ Polymer use is increasing with more and more sediment sent for inland treatment
- ✓ Geotextile tubes have a good balance between water quality-cost-ease of use-drying time ...



SNF in Riceboro Georgia 35 years of production and service

