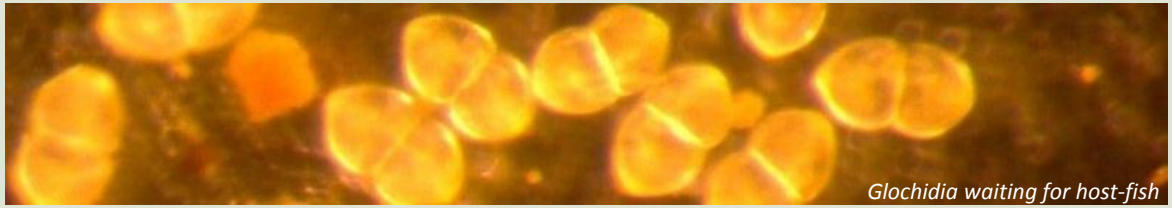
BENDING RIVERS BY MUSSELS

Kids having fun(?) sampling @ Fyleån Creek

- WILL IT PAY OFF?



Glochidia waiting for host-fish

OUTLINE…

- *The project*
- *Objectives*
- *Results and achievements*
- *The Fyleån Creek*
- *The mussel (U. crassus)*
- *Ecosystem services*
- *Summery*

Unio crassus

UC4ILIFE @ Silvåkra

THE UC4LIFE PROJECT (2012 – 2016)

Restoration

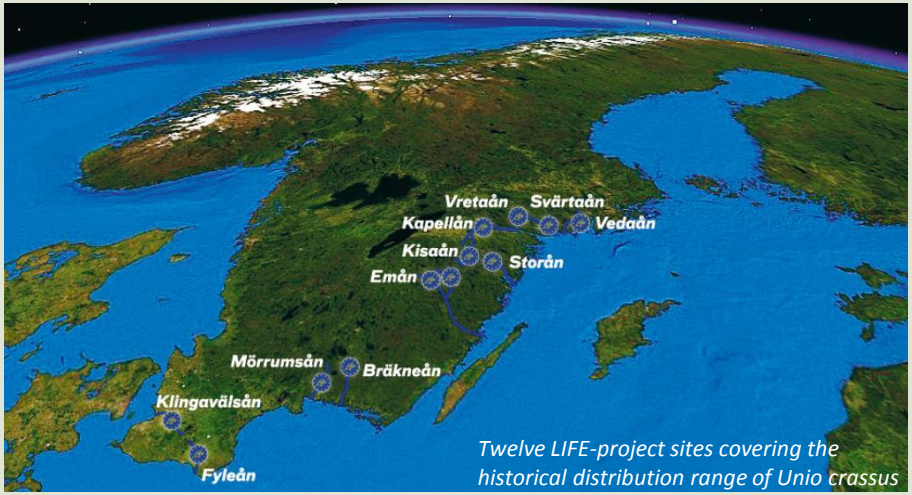
Scientific approach

Mussel work

Monitoring and information

@ twelve sites

- Site specific measures
- Habitat enhancements
- Migration barriers
- Re-introduction
- Allocation



Twelve LIFE-project sites covering the historical distribution range of Unio crassus

Länsstyrelserna
Skåne, Blekinge, Jönköping, Södermanland, Östergötland

NATURA 2000

Life

NATUR VÅRDS VERKET

Swedish Agency for Marine and Water Management

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ONE VERY CLEAR OBJECTIVE…

Dead organic matter (Cladophera) @ the Österlen shoreline

A HEALTHIER BALTIC SEA BY LANDBASED MEASURES…

- Water quality improvements
- Increased biodiversity
- Knowledge and public understanding
- Catalyst…
- *The Baltic Sea as the platform…*

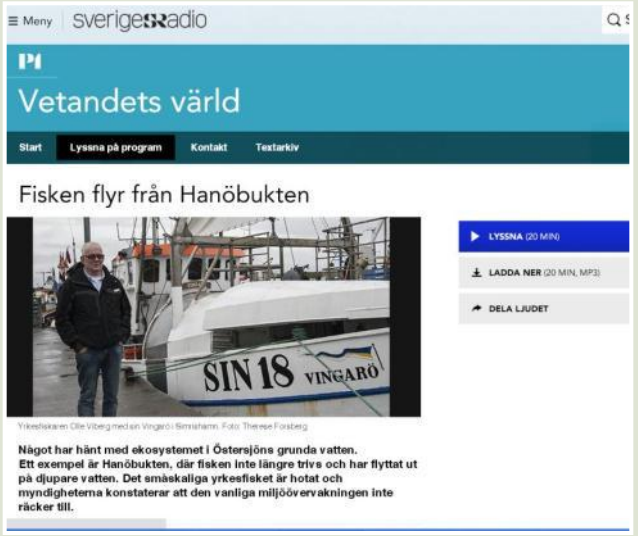
THE MOST POLUTED SEA IN THE WORLD

Algal-bloom in the southern Baltic Sea

EUTROPHICATION:

- Algal blooms
- Oxygen deprivation (>15%)
- Collapses of fish populations
- Loss of ecosystem services

Acidification, toxins etc



LANDBASED SEA PROBLEMS

Fyleån Creek, pre-restoration conditions

Fyledalen Valley was drained during the thirties (to gain agricultural areas):

- Changes in hydrology (faster discharge and dryer floodplain conditions)
- Negative impact on the habitats, biodiversity and water quality.
- Negative impact on the Baltic Sea.

Floodplain restoration was initiated 2013

THE FYLEÅN CREEK PROJECT (2013)


Pre-restoration conditions


Post-restoration conditions

The objectives were to recreate the hydrological regime, habitats and connectivity…

CONCRETE ACHIEVEMENTS:

- Re-meandering (5 km, 1 km longer today)
- Rising the groundwater level (70 ha)
- Restored wetlands, 9
- Opening up tributaries, 4
- Habitats suitable for *U. crassus*
- Re-introduction of *U. crassus,* previously extinct

WHY FOCUSING ON A MUSSEL?

- A symbol / indicator for a healthy environment

  Unio crassus = claen water= healthy kids

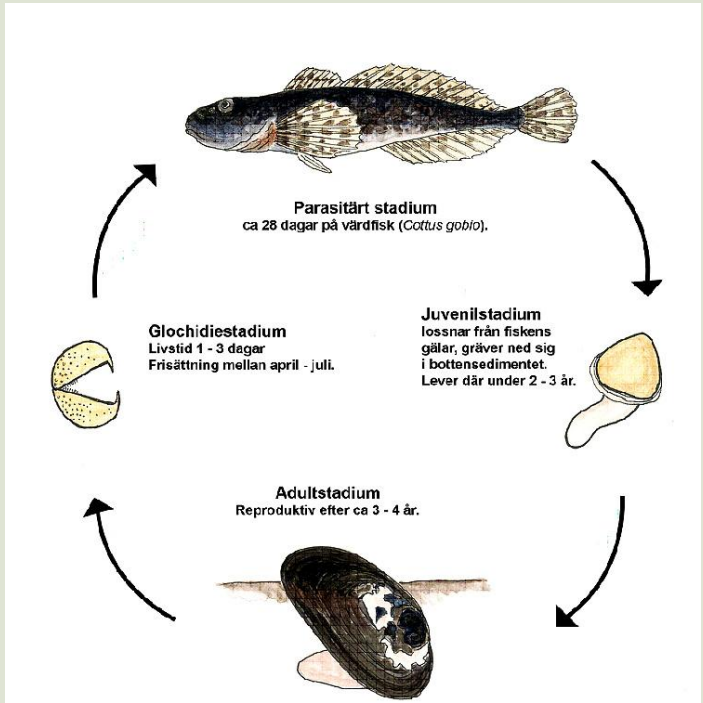
- A good pedagogue
- Huge historical distribution, today threatened
- Filter the water (40 L/24h) reducing nutrients
- Long lived, complex lifecycle…

European Parliament Member I. Löwin @ Fylan opening ceremony in May 2014

CRACKING THE U. CRASSUS LIFE CYCLE ENIGMA

Fish infected by glochidia

1) Functional species, river specific ?



Why being a parasite(?): food, protection and dispersal…

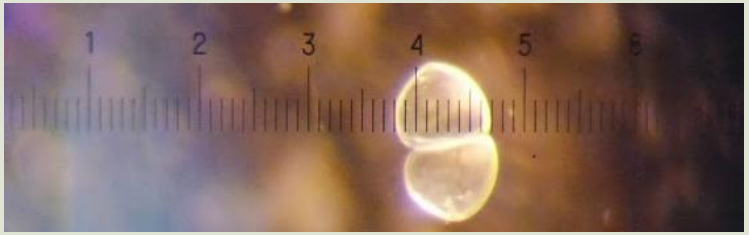
2) Farming methods …

THE RETURN OF UNIO CRASSUS (2013 – 14)


Unio crassus re-introduced, first-time ever in Sweden

Re-introduction of *U. crassus:*

400 infected fish, 140 000 glochidia
8 300 juveniles (including controls)



The long term objective is a strong *U. crassus* population in less than 10 years in Fyleån Creek. Additional re-introductions elsewhere…

Crassus dancing

BUT, IS IT WORTH IT?

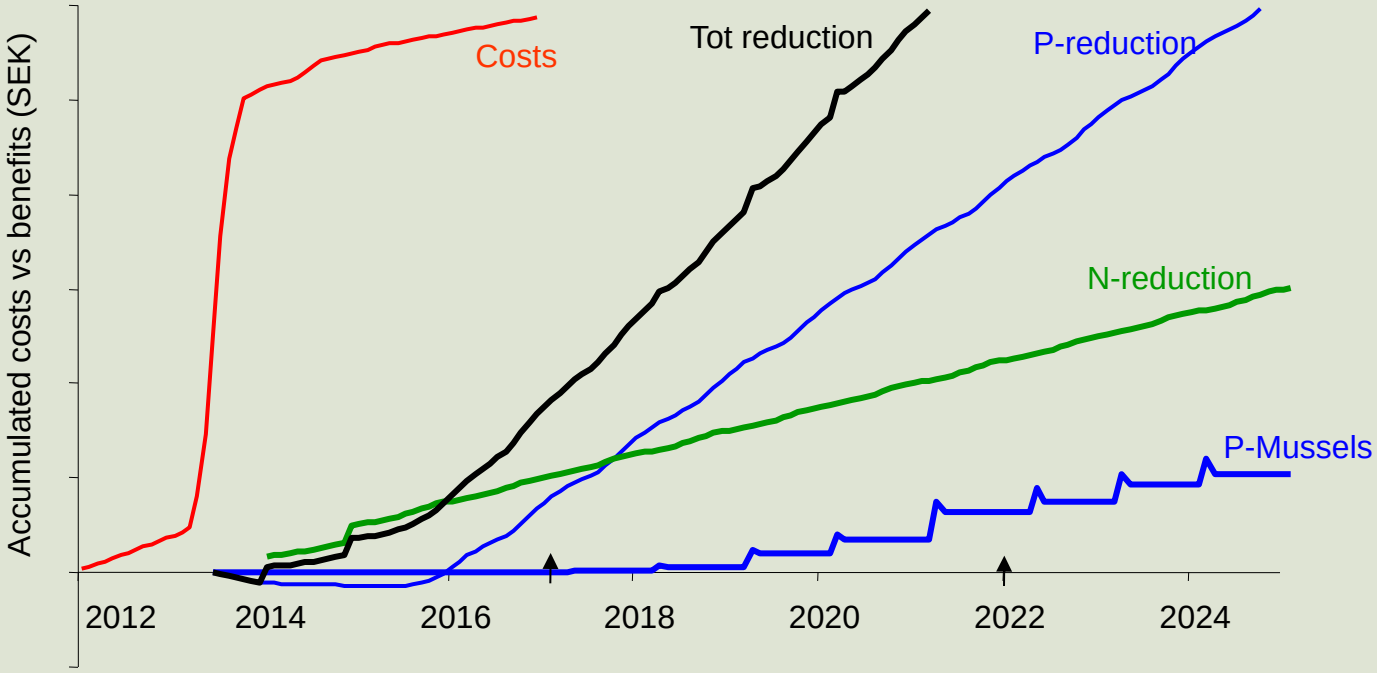
U crassus filtering water, reducing nutrients (also being a key stone, providing habitats etc)

From an ecological point of view… yes – we believe so
From a socio-economical point of view… Hmm

PRICING THE PREDICTED OUTCOME OF:

Water quality	Less nutrients	1023 and 31 SEK/kg (P, N removed)
Fish production	higher	9 SEK/fish and 108 SEK/kg salmonid
Recreation	improved	willingness to pay
Biodiversity	higher	???

PREDICTED WATER QUALITY IMPROVEMENTS

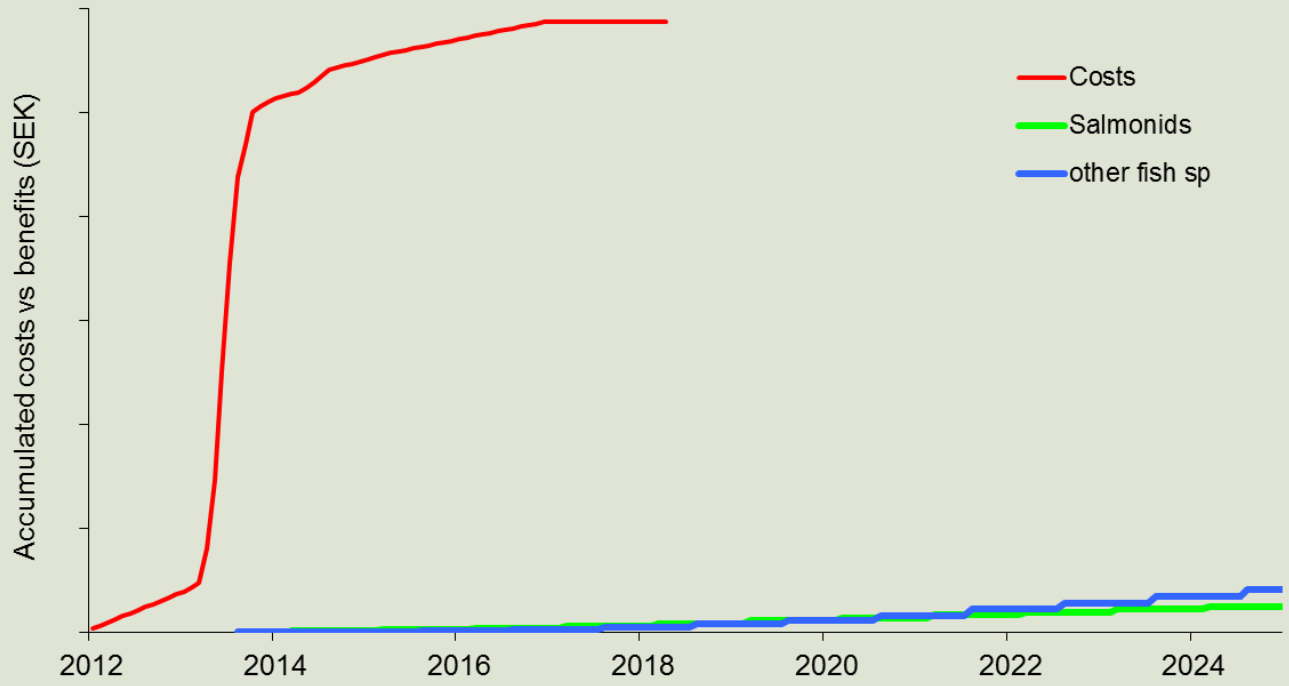


Action costs *c.* 6 MSEK

Benefits: P-reduction (range: -20 to 80 kg per month [1023 SEK per kg]) by floodplain actions
N-reduction (range: 100 to 300 kg per month [31 SEK per kg]) by floodplain actions
P-reduction by mussels feeding and storing (range 0.1 to 1.2 g per individual and year).
Population density will level out 2030 (Carrying capacity 3 M individuals)

Benefits will balance costs 2021 ?

PREDICTED INCREASE IN FISH PRODUCTION



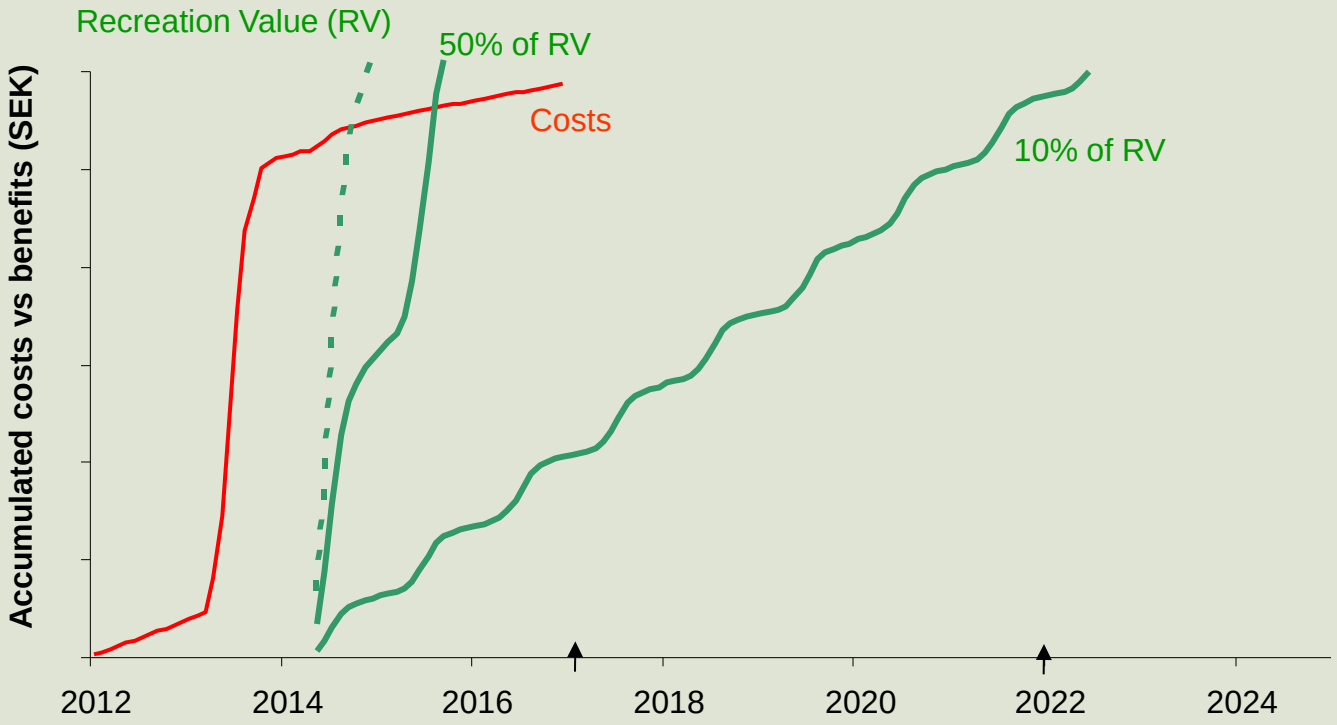
Action costs *c.* 6MSEK

Benefits: Fish, annual production (range: 200 – 10 000 individuals, 9 SEK/fish):

Benefits: Salmonids, annual production (range: 100 – 250 kg, 108 SEK/kg)

Benefits will balance costs 2070?

PREDICTED IMPROVEMENTS IN RECREATION



Action costs *c.* 6 MSEK

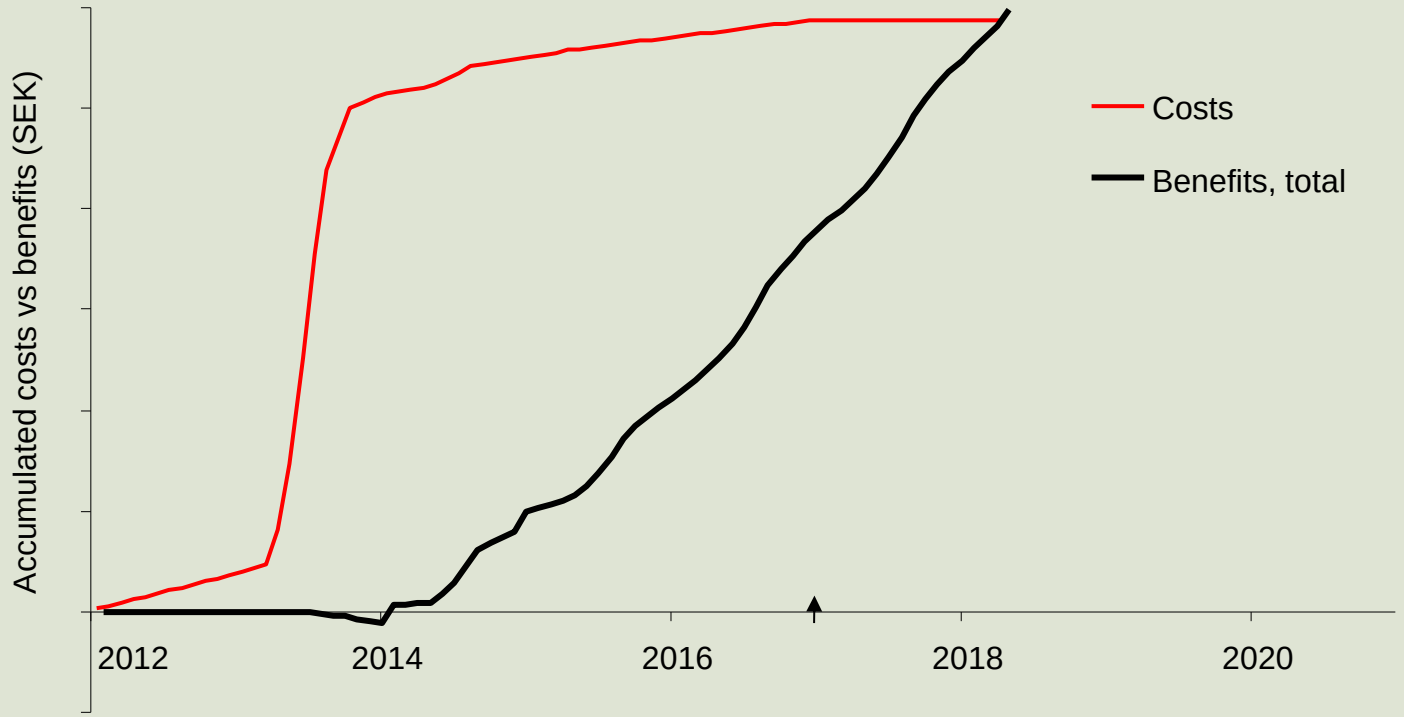
Benefits: Willingness to pay 350 SEK per visit, annually 20 000 visits in Fyledalen

Willingness to pay for Action costs (50% of RV), 175 SEK ? – Balance 2015

Willingness to pay for Action costs (10% of RV), 35 SEK ? – Balance 2023

The study (questionnaire) will be repeated the following years to test "new" RV and accurate "willingness to pay" numbers for actions costs…

WHEN COSTS BALANCE BENEFITS



Predicted benefits (recreation + water quality improvements + increased fish production) balance project costs by 2018…

CONCLUSIONS





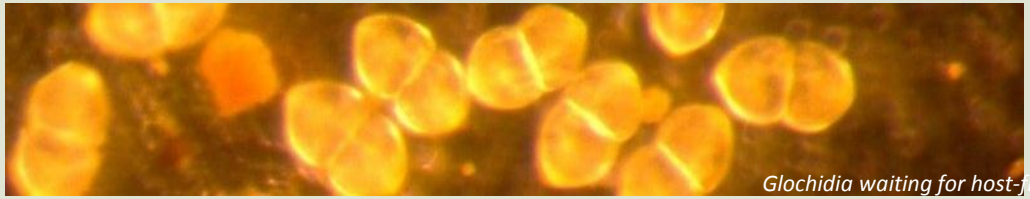
BENDING RIVERS BY MUSSELS MIGHT JUST WORK…

- Restoration measures completed
- Farming and re-introduction of *U. crassus*
- Fyleån Creek project and *U crassus* functions as catalysts

IS IT WORTH IT, *ALSO* FROM A SOCIO-ECONOMIC PERSPECTIVE ?

- Valuing ecosystem services by CBA´s may create an economic motivation for protection of habitats and species… *and for restoring habitats and re-introduction of species…*
- Time scale important to understand…
- For future LIFE-projects, CBA's obligatory?
- Not able to put price tags on for example biodiversity…
- Just a complementary tool

THANKS



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