

SEA URCHIN REMOVAL TO RECOVER NORWAY'S KELP FORESTS


A new business opportunity to support nature restoration


Large areas of Norwegian kelp forests were replaced by urchin barrens and can be recovered via effective urchin removal strategies.


Sea urchin roe (gonads) is a seafood delicacy with traditional markets in many countries across the world.


Sea urchins on barren grounds starve after destroying the kelp forest and become virtually empty and of no commercial value.

Urchin ranching can transform them into an economically valuable seafood product.

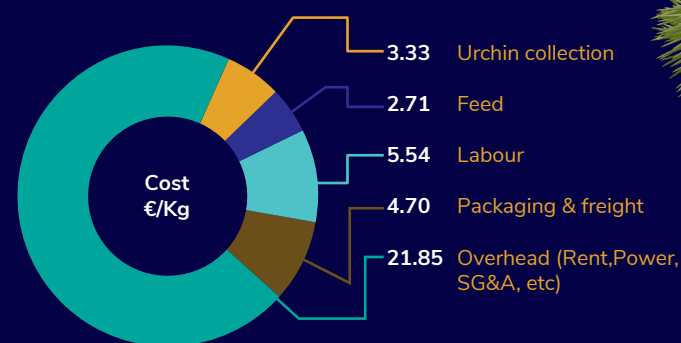
 **5000 km²**
of urchin barrens remaining

 **80 million tonnes**
of urchins

 **16000 tonnes**
~20% of urchins viable for ranching

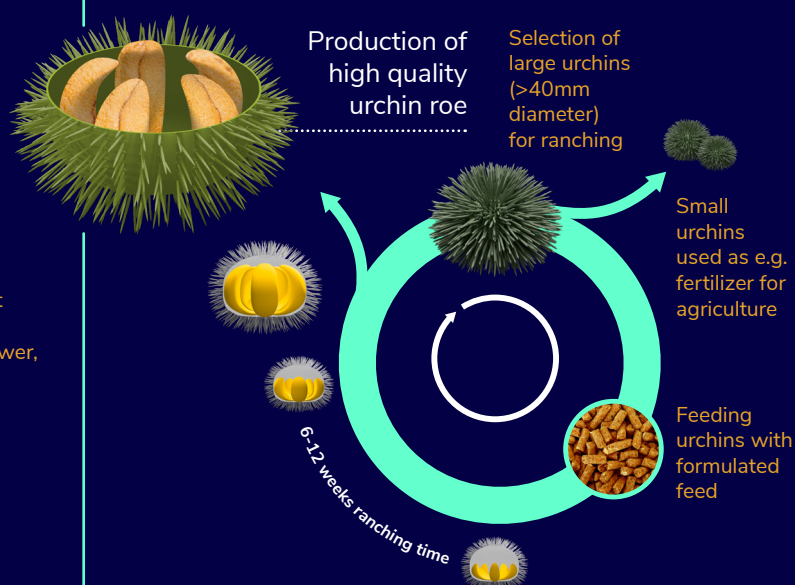
 **€16.7 million / km²**
Value of Laminaria kelp forests of the N Atlantic

Sustainable business model for sea urchin ranching



TOTAL COST: 38.13 €/Kg
WHOLESALE PRICE (15% Profit Margin): 44.58 €/Kg

Urchin ranching process



Harvesting solutions

Technology-driven harvesting solutions

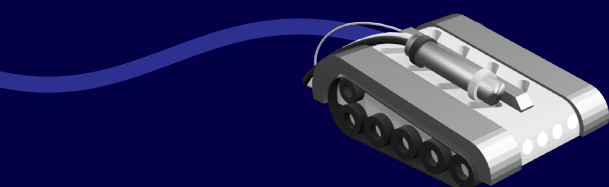
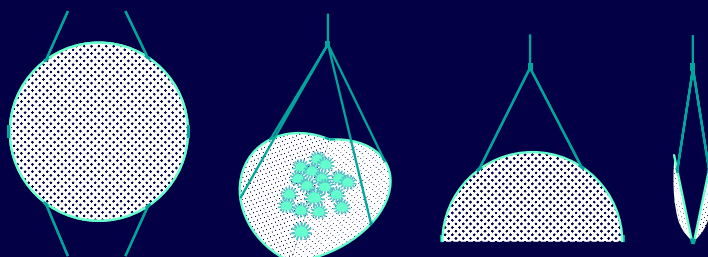


Illustration based on C-Robotics C-Bud model

Harvesting technologies are being developed to increase catch efficiency, scale up urchin harvest, remove the need for divers (ROVs), reduce operating costs, and have the potential to harvest & monitor urchin populations simultaneously.

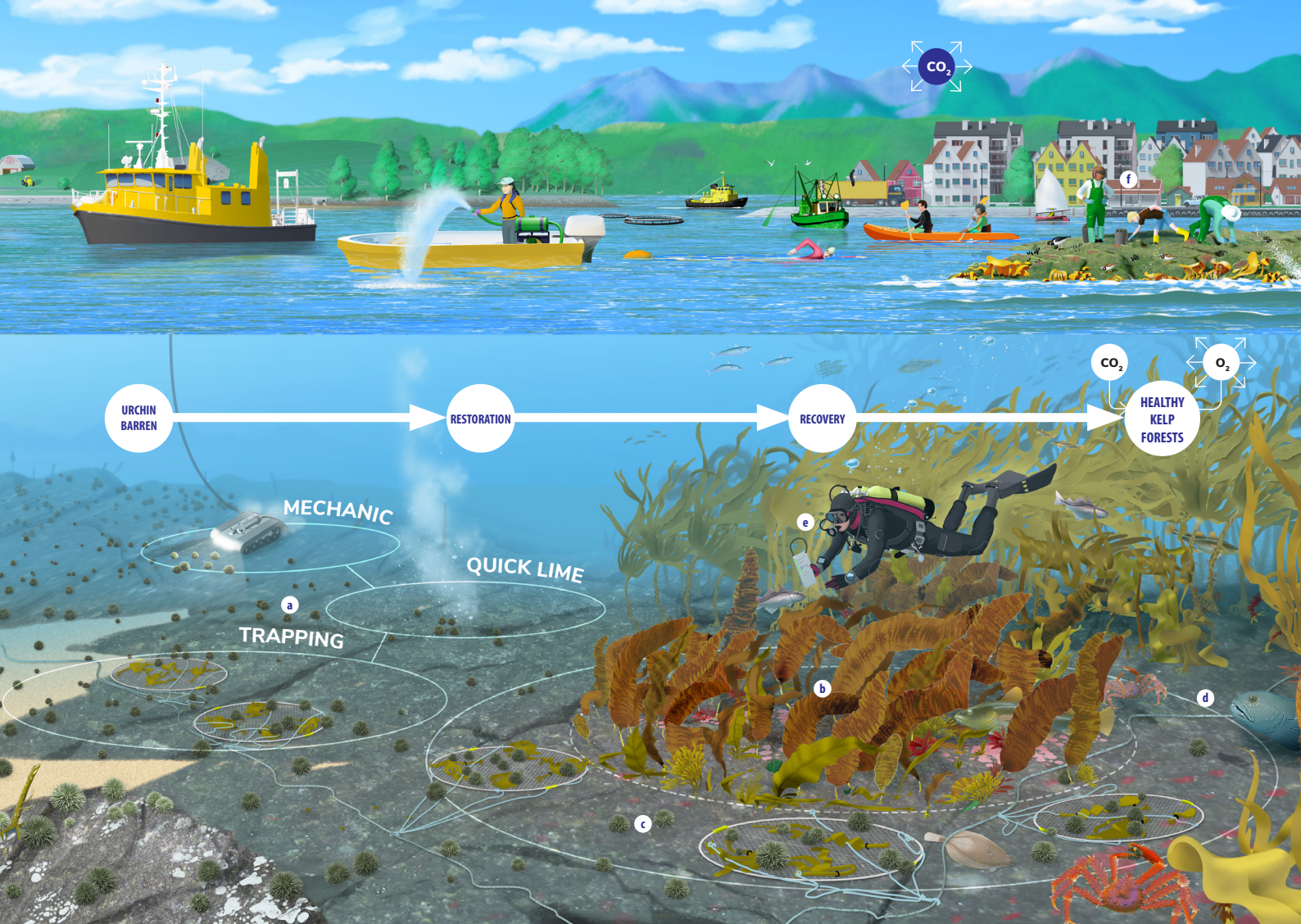
Collapsible Round trap



Developed by  **Nofima**

The baited traps exploit the urchin's aggregating behaviour and demonstrated high catch efficiency and cost-effectiveness. Harvested urchins are in good condition for subsequent ranching.

~165 urchins / 4.8 – 8 kg Catch rate (easy to scale up)



a Urchin removal from barrens via culling or harvesting b Kelp recovery plot c Harvesting urchin aggregations in transition areas to expand recovery plots d Urchin predators re-established e Monitoring f Citizen science to support urchin removal

THE PROCESS OF RESTORING KELP FORESTS FROM URCHIN BARRENS

A stepwise approach using efficient harvesting methods and cross-sectoral collaborations

- 1 Intensive harvesting of urchins from barrens reduces abundances to sufficiently low levels to allow for kelp recolonisation.
- 2 Kelp beds are formed in recovery plots and urchins aggregate in the transition areas to feed on kelps and other macroalgae.
- 3 There is now an increased economic incentive for harvesting. Feeding urchins increase their gonad weight and hence their ranching and market value.
- 4 Continued removal of urchins from recovery areas is needed to avoid the reestablishment of the barren state until urchin predator populations have recovered.
- 5 The final state is a self-sustaining kelp forest ecosystem with all its biodiversity, ecosystem services and urchin predator populations.

Illustration and graphic design João T. Tavares 2021

Do you want to know more?

Download the full report from:

<https://niva.no/en/reports/restoring-norways-underwater-forests>
<https://seaforester.org/#project-norway>

Collaborating Institutions

NIVA

Akvaplan
niva

seaforester