



**Ministry of Environment
and Food of Denmark**
Environmental
Protection Agency

Overview of land remediation in Denmark

ICCL
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Deputy Head of Division
Niels Bukholt

Agenda

Facts about Denmark

Contaminated soil act

Organization and financing

Groundwater –untreated and Surface water

Identification and clean-up of contaminated sites

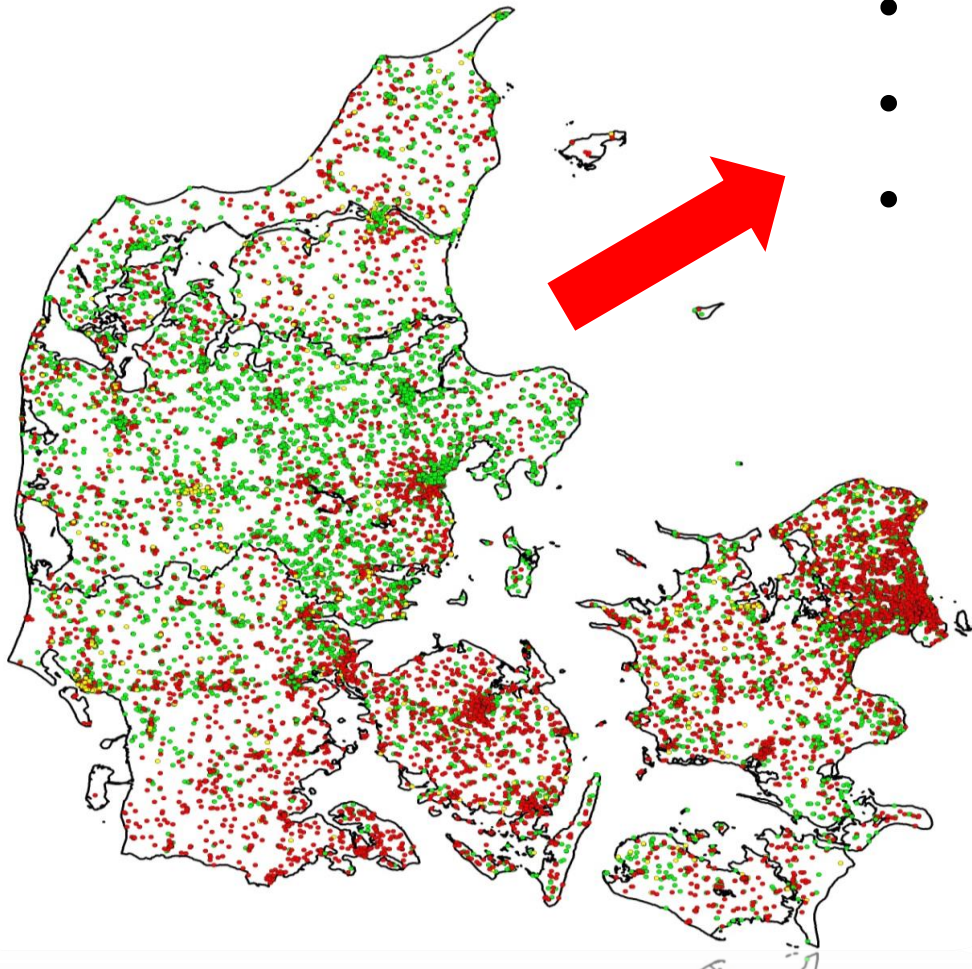
New tools

Special issue: EU Water Framework Directive and contaminated land



The challenge today

35-40.000 polluted sites



Goals in water plans

- 650 lakes
- 21.000 km water ways
- 7.314 km coast line (78 fjorde)

Facts about Denmark

- **Planning zones for cities and rural land**
- **Bigger cities, new use of Industrial land, harbors,**
- **Large part of the country laid out as potential area for drinking water**
- **5,7 million people**
- **43000 km²**
- **7300 km coastline**
- **650 lakes and 21.000 km of water ways**
- **Flat (highest point 170 meters over sea level)**
- **Rain (annual 712 millimeters)**
- **3000 landfill sites**
- **30 active landfills**
- **600.000 companies**



Contaminated soil act

Background

From 1980 the problems began, law on toxic landfills 1983, publicly financed mapping and clean ups, areas with drinking water interests, more rules and bans on pesticides. Then January 1, 2000 law on contaminated soil

Focus areas

Polluter pays principle

Mapping (ground water, surface water, Natura 2000-areas and houses etc.

Help to house owners with pollution

Rules on how to move soil from contaminated land



Organization

State: rules, guidelines and financing

Regions: mapping and clean up, financing: 55 million Euros a year

Municipalities: planning, move soil, building permits, and enforcement on polluters



Groundwater and surface water

**Denmark use untreated ground water for drinking
Amount of drinking water: 190 million cubic meters a year**

No treatment required, but any pollution can close a well. Constant challenge

**Large areas laid out as potential drinking water areas
Protection of these areas can take many forms**

**Increased demand on surface water: EU Water Framework Directive,
recreational use, swimming in harbors**



Identification and clean-up of contaminated sites

Denmark has been mapping different sites since 1980, but mostly since 2000 following the law on contaminated soil

Status: 35.000 sites potential or actually polluted, 18.000 under public responsibility, 17.000 outside, 10.000 possibly polluted and 8.000 polluted

Gas and petrol stations has been cleaned up by industry. They have checked 10.000 sites, cleaned 3.400 sites at a cost of 270 million Euros.

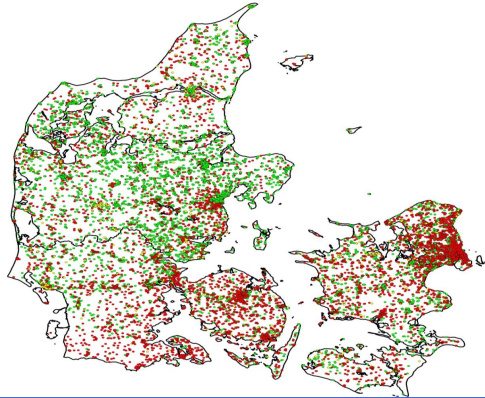


New tools

Ground risk
Surface water
Administration

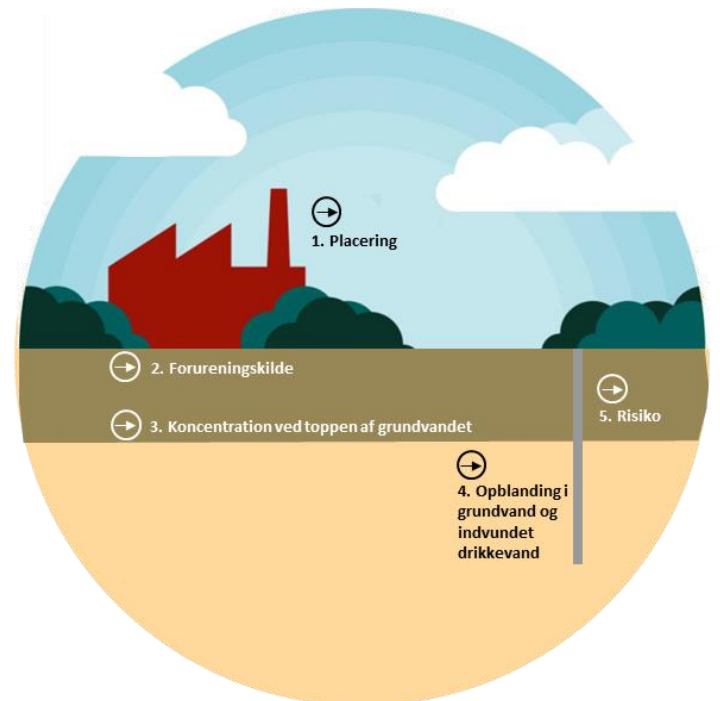
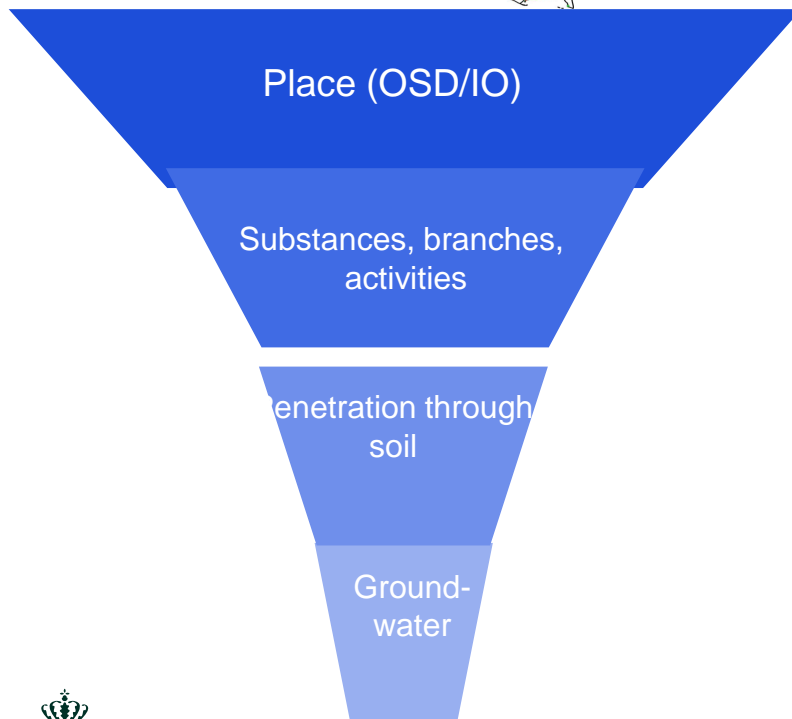


Risk screening



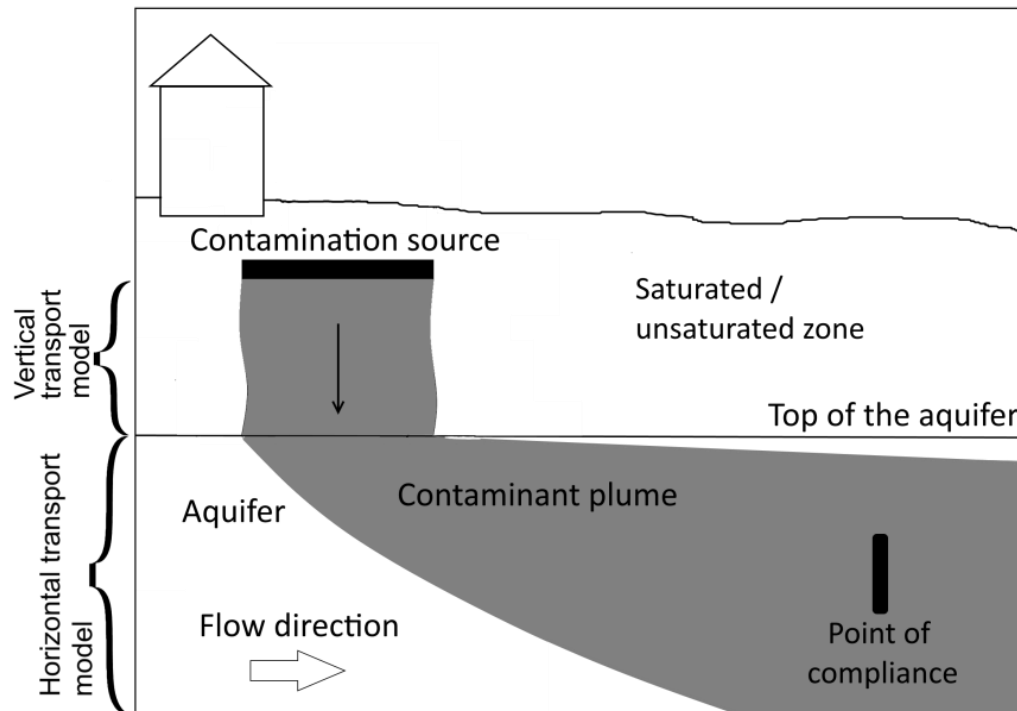
Purpose:

- Preliminary screening of all V1 og V2 sites
- Removing sites which do not pose a treat



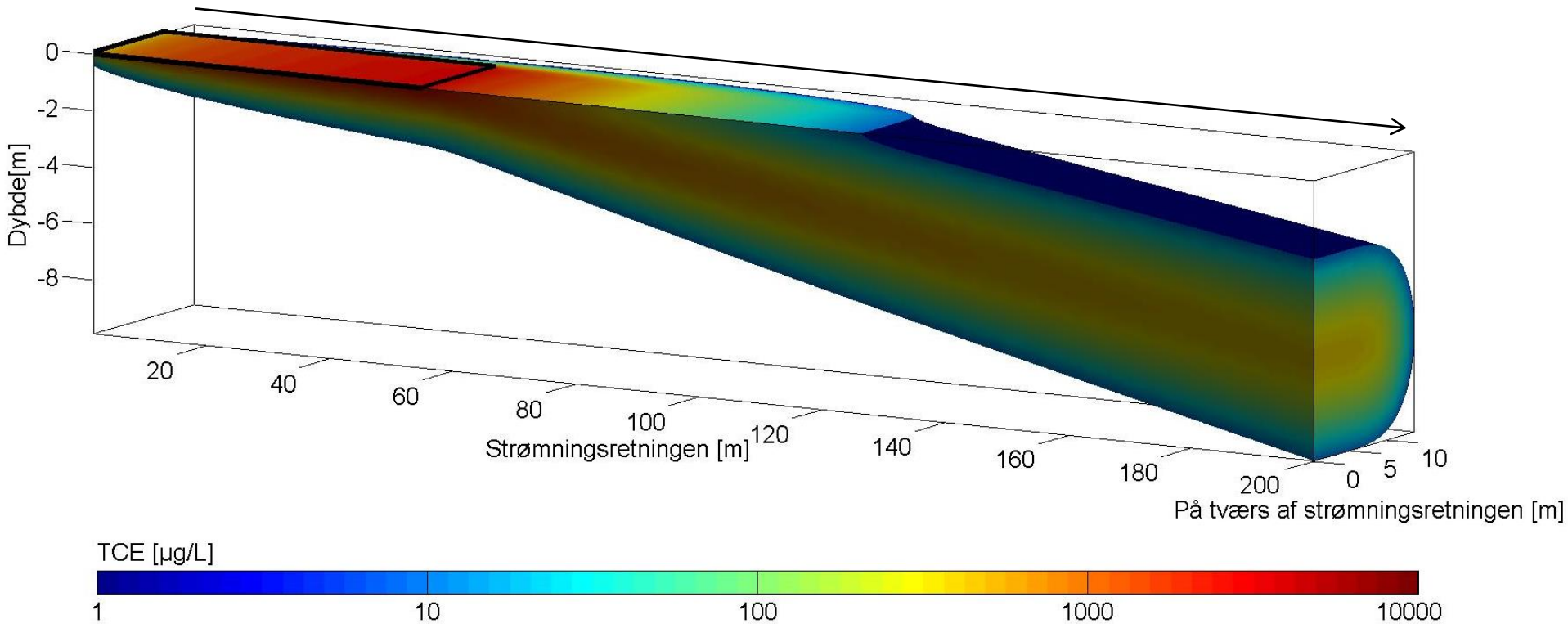
GroundRisk - Risk evaluation

- 5 vertical modeller
- 1 horizontal model (ground water transport)



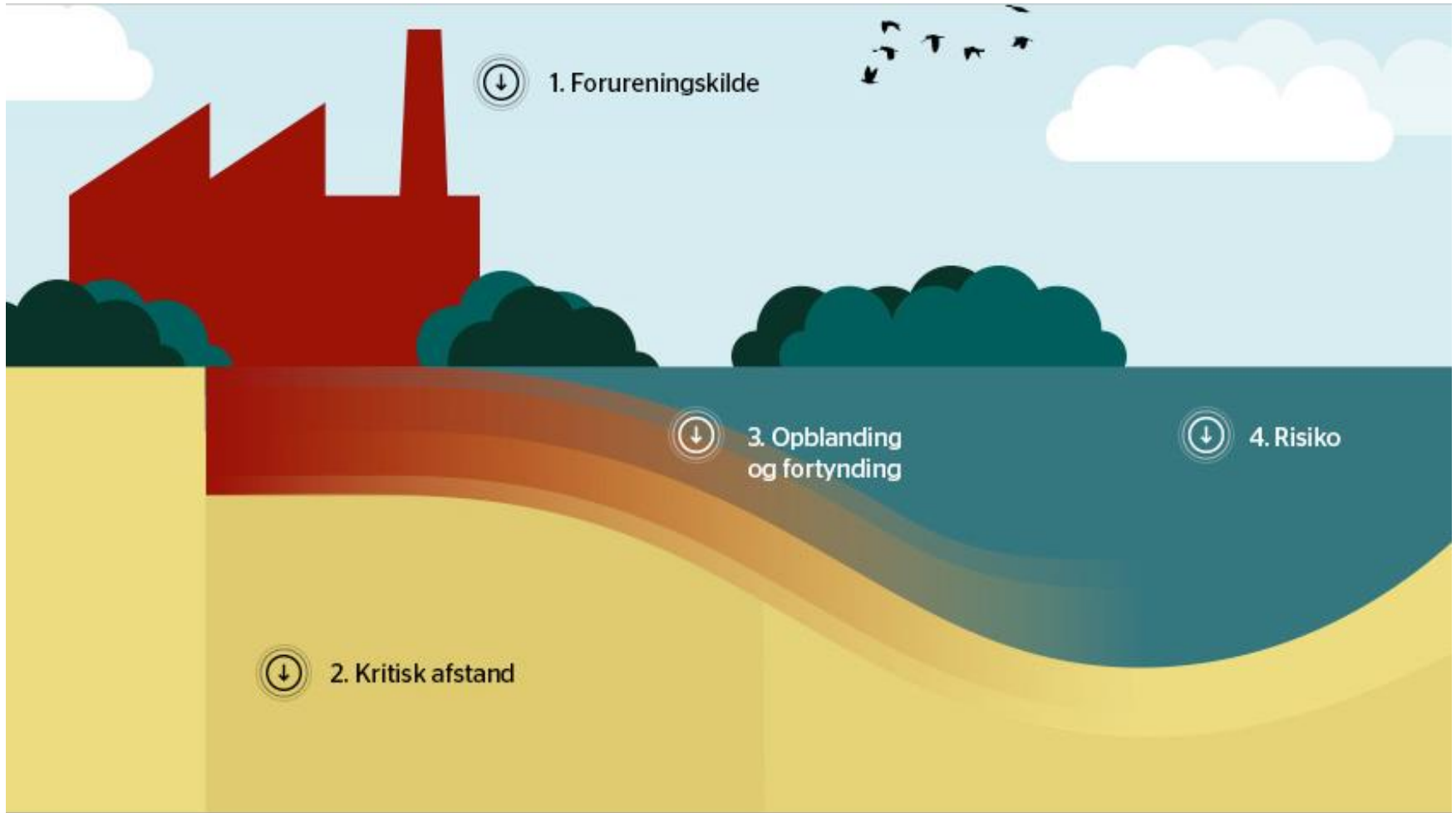
Output/resultater

- GroundRisk calculates spread in 3 dimensions:
 - Spread stream direction (x)
 - Across stream direction g (y)
 - Depth (z)



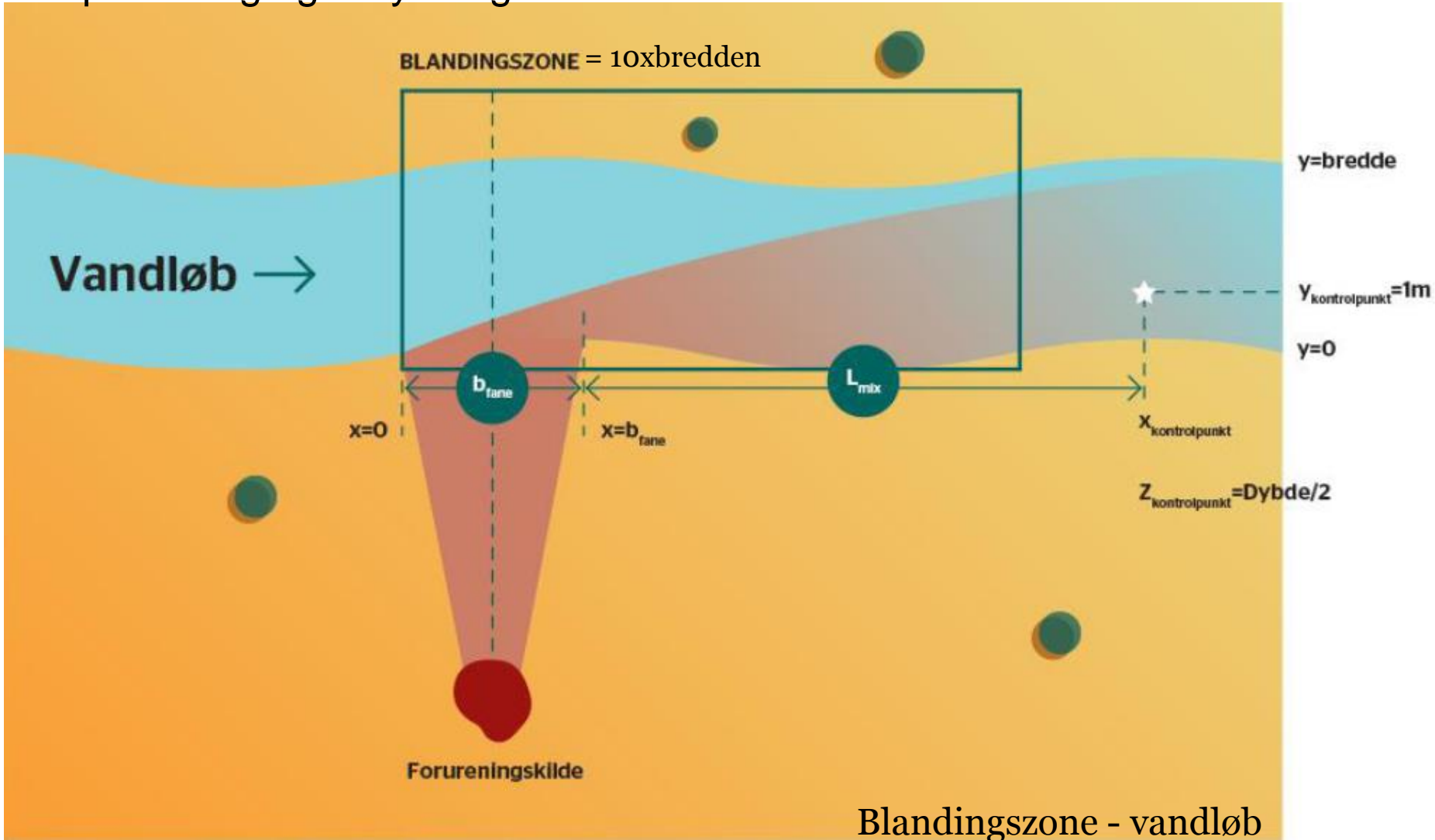
Surface Water - Screening steps

1. Pollution source



Screeningstrinene

3. Opblanding og fortynding



Blandingszone - vandløb



EU Water directive

Determining quality of surface water

Issue as regards level of clean up

Issue as regards multiple sources of pollution

Experience from other countries

