NIBIO
NORSK INSTITUTT FOR BIOØKONOMI

Ecosystem services; Activities at Norwegian Institute of Bioeconomy Research (NIBIO)

Arne Sæbø and Hans Martin Hanslin, NIBIO Særheim

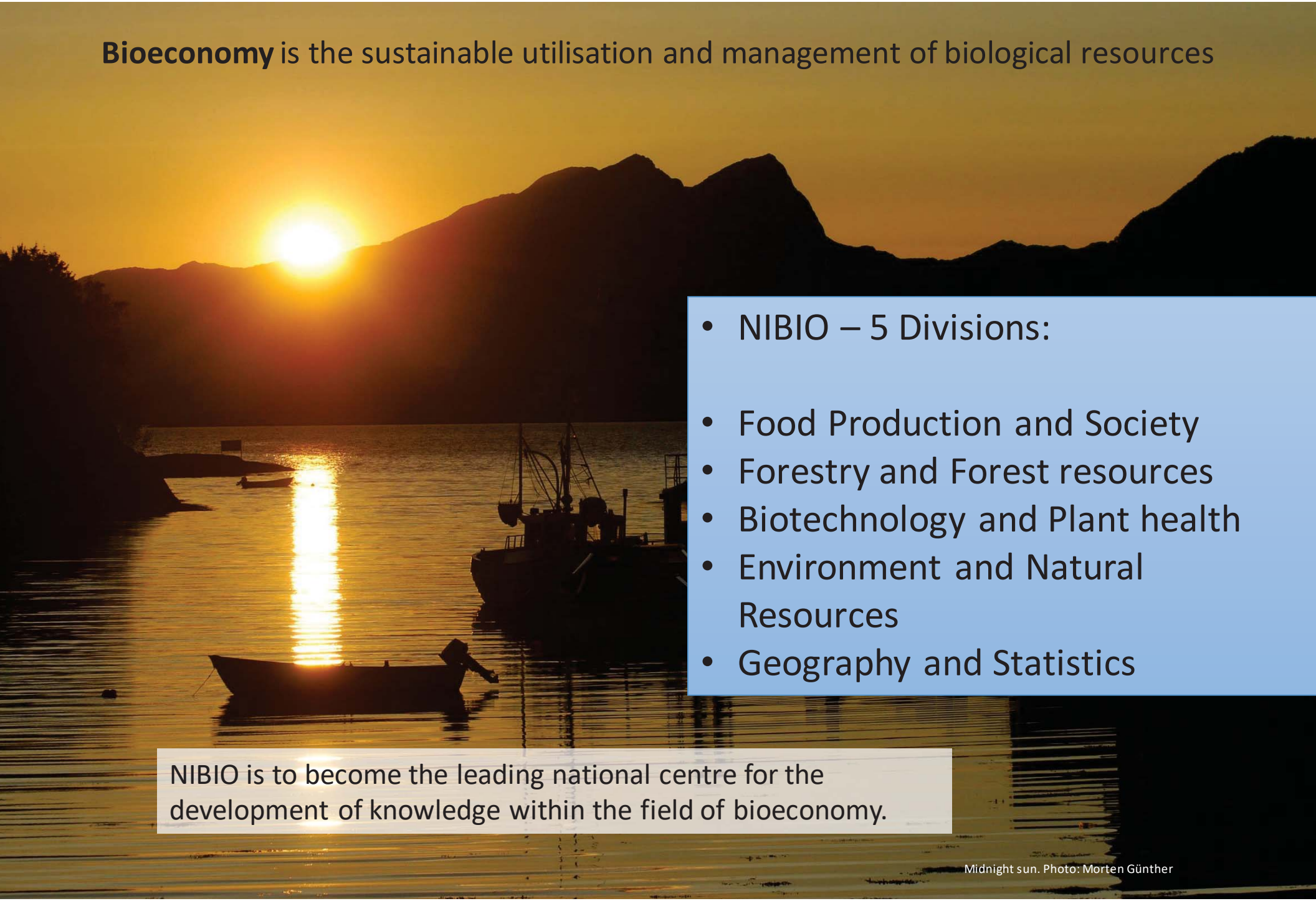
NIBIO: One of Norway's largest research institutes

Large distance from south to north, with many climate zones. 1700 km from Lindesnes to Nordkapp in a straight line, 2500 km by car.

680 employees in different locations.
Annual turnover 77 million Euro.
Owned by the Ministry of Agriculture and Food.

Photo: Ragnar Våga Pedersen

Bioeconomy is the sustainable utilisation and management of biological resources



- NIBIO – 5 Divisions:

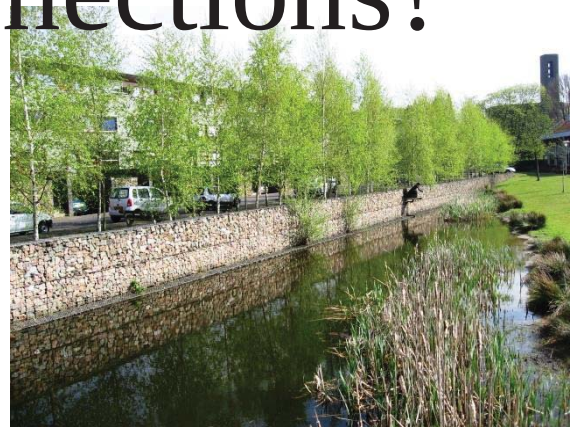
- Food Production and Society
- Forestry and Forest resources
- Biotechnology and Plant health
- Environment and Natural Resources
- Geography and Statistics

NIBIO is to become the leading national centre for the development of knowledge within the field of bioeconomy.

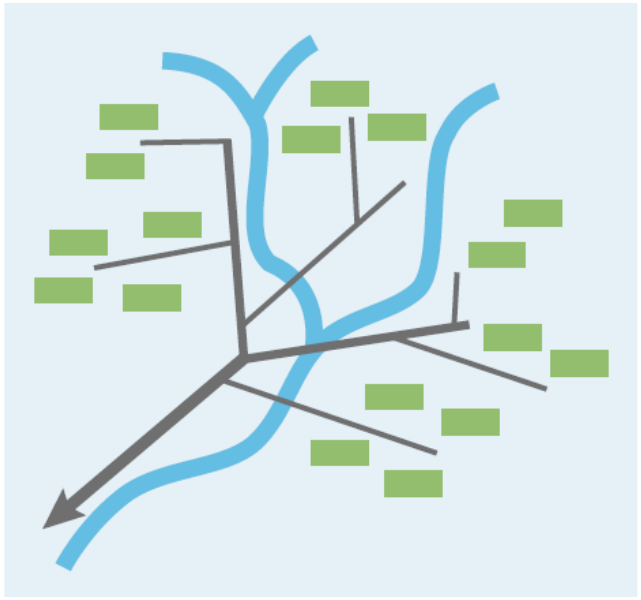
Midnight sun. Photo: Morten Günther

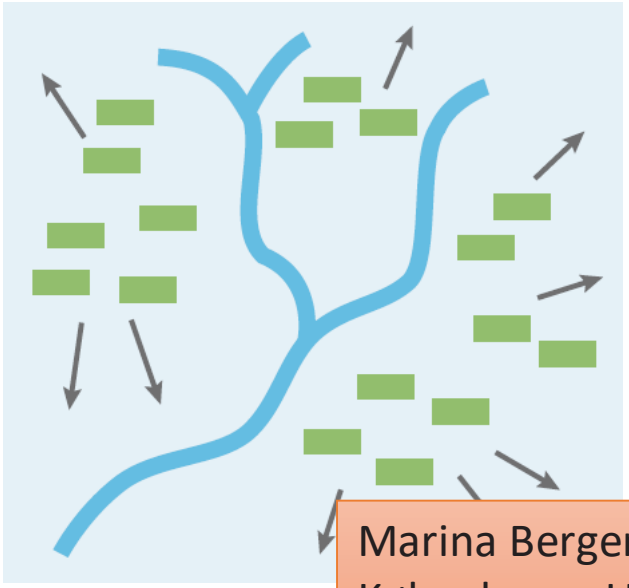
Replacing with bigger pipes?
Make disconnections?

Sewer based adaptation (grey)



Landscape based storm water management (LSM, or green adaptation)

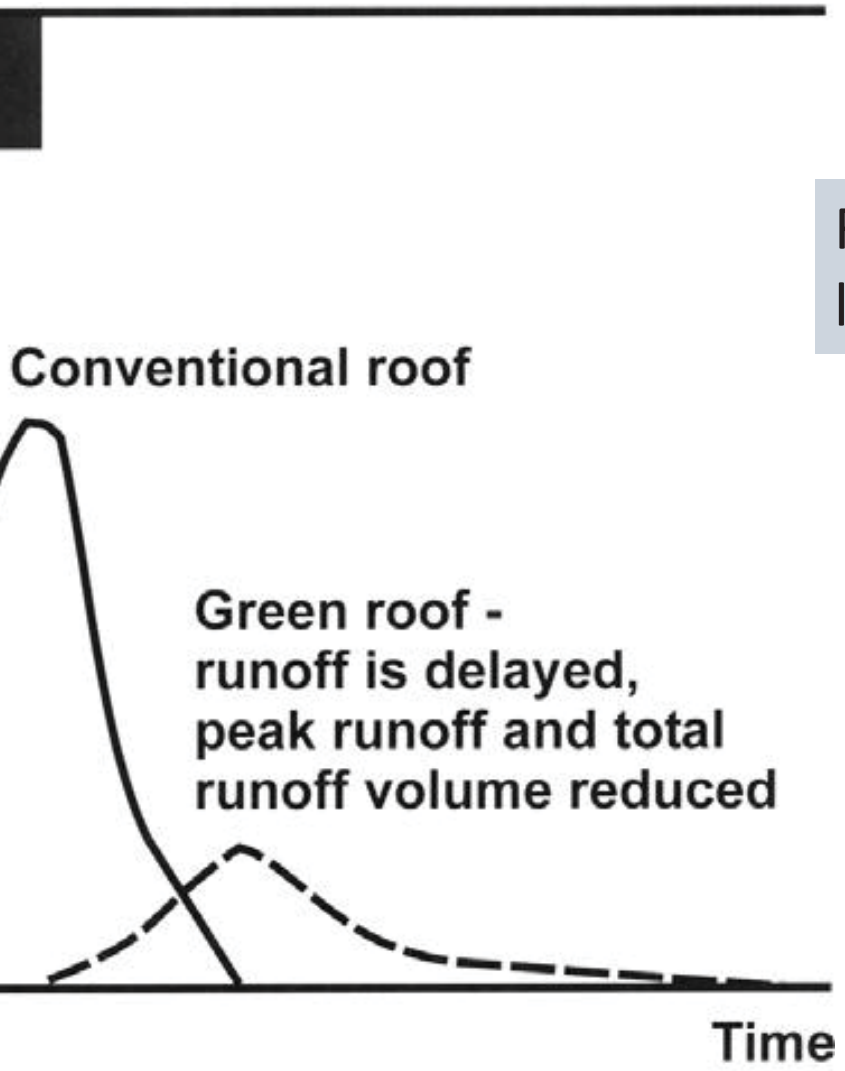




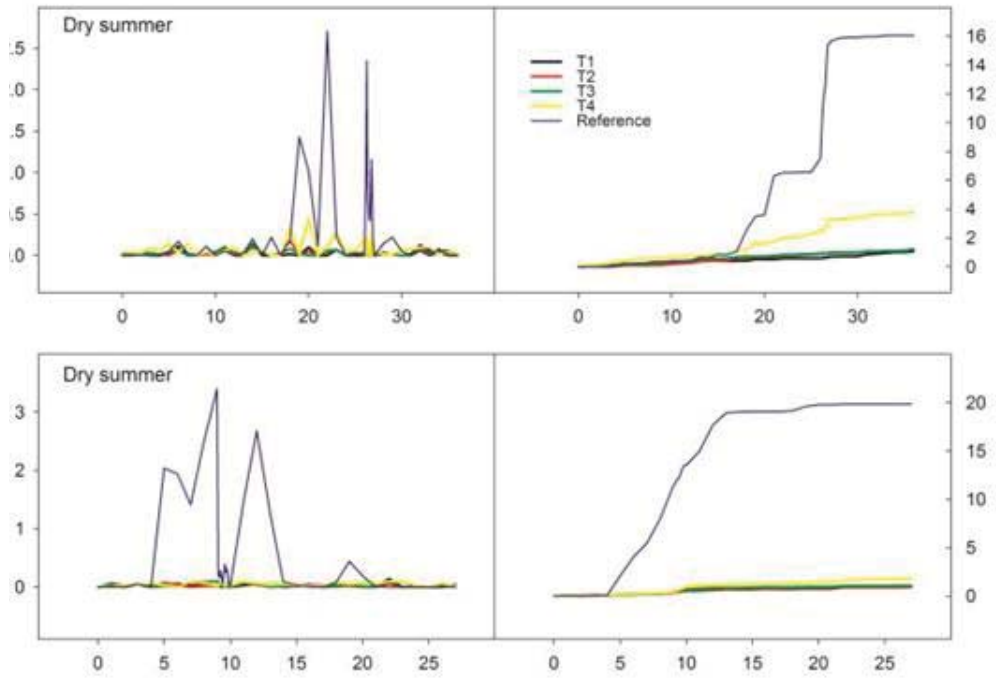
Marina Bergen Jensen
Københavns Universitet

Research facility for green roofs

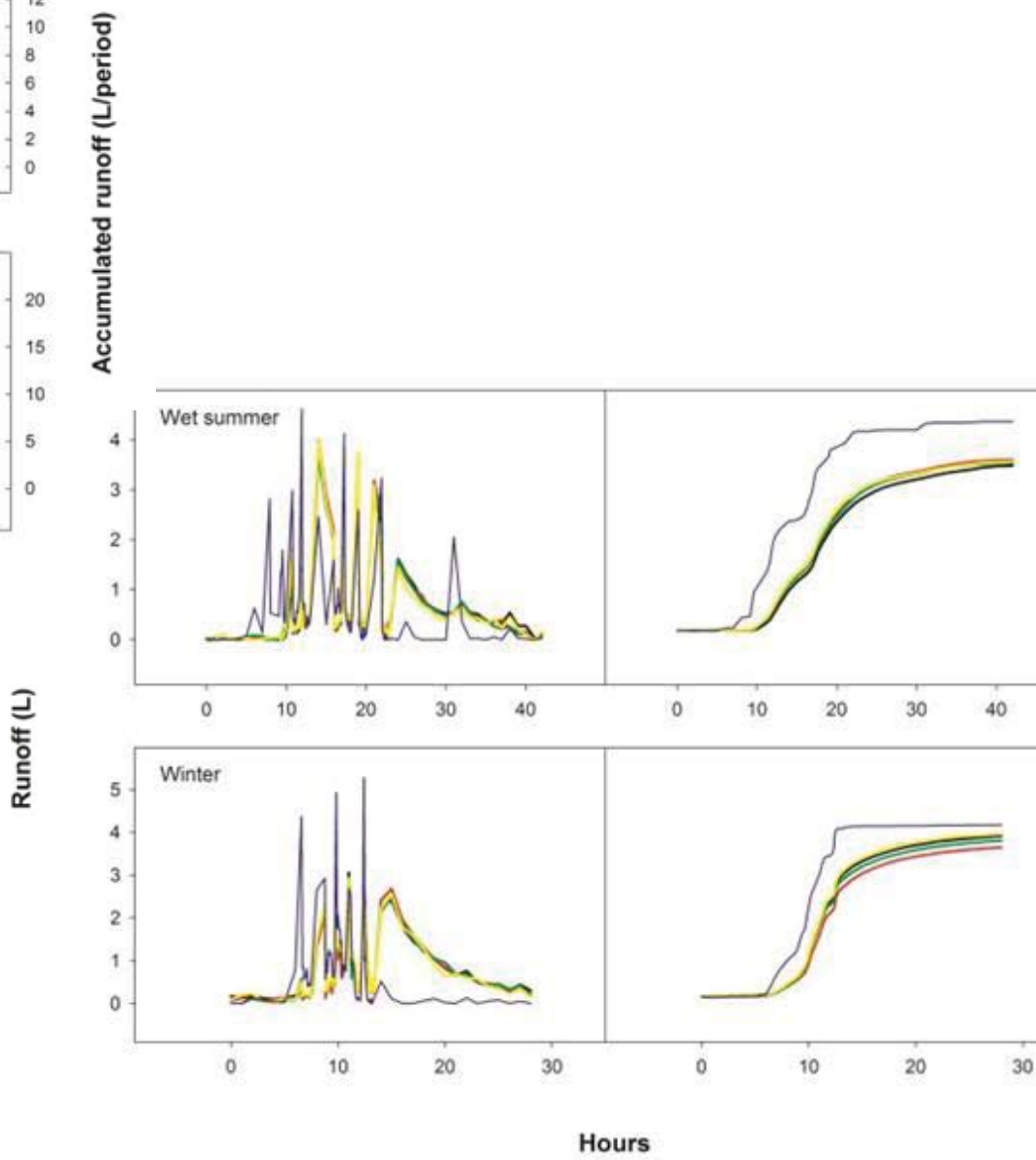
0 measuring stations, each are; 2 x 3 meter
ogging of weather data, run off and humidity in the medium
ontrol; Bare roof with no vegetation

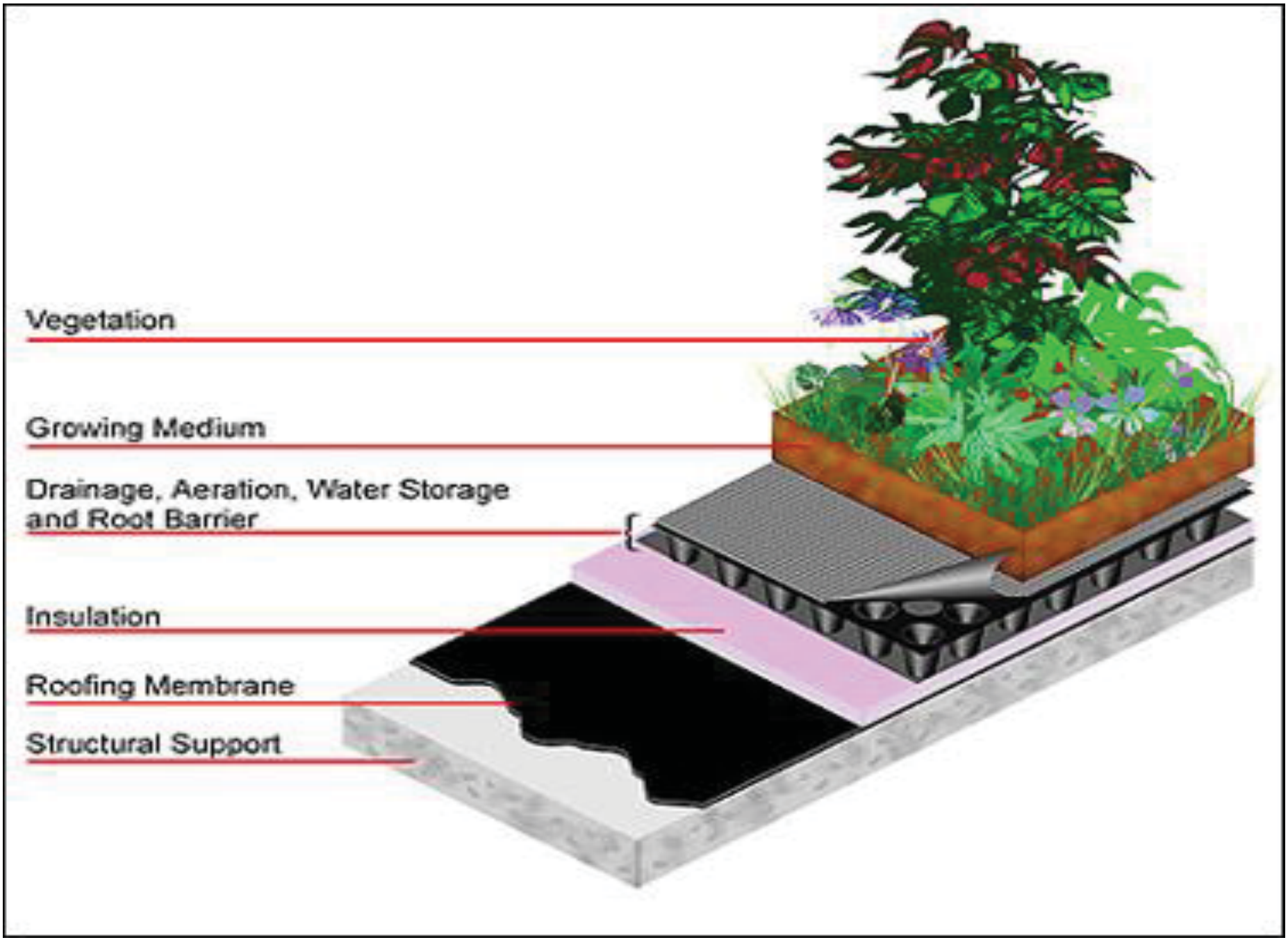


Figure; Stovin et al., 2012. The substrate does not
large effect, unless there is a basin function in the



mation of runoff 2016
mall differences between substrates
arge effect after dry period
mall effect after rain events

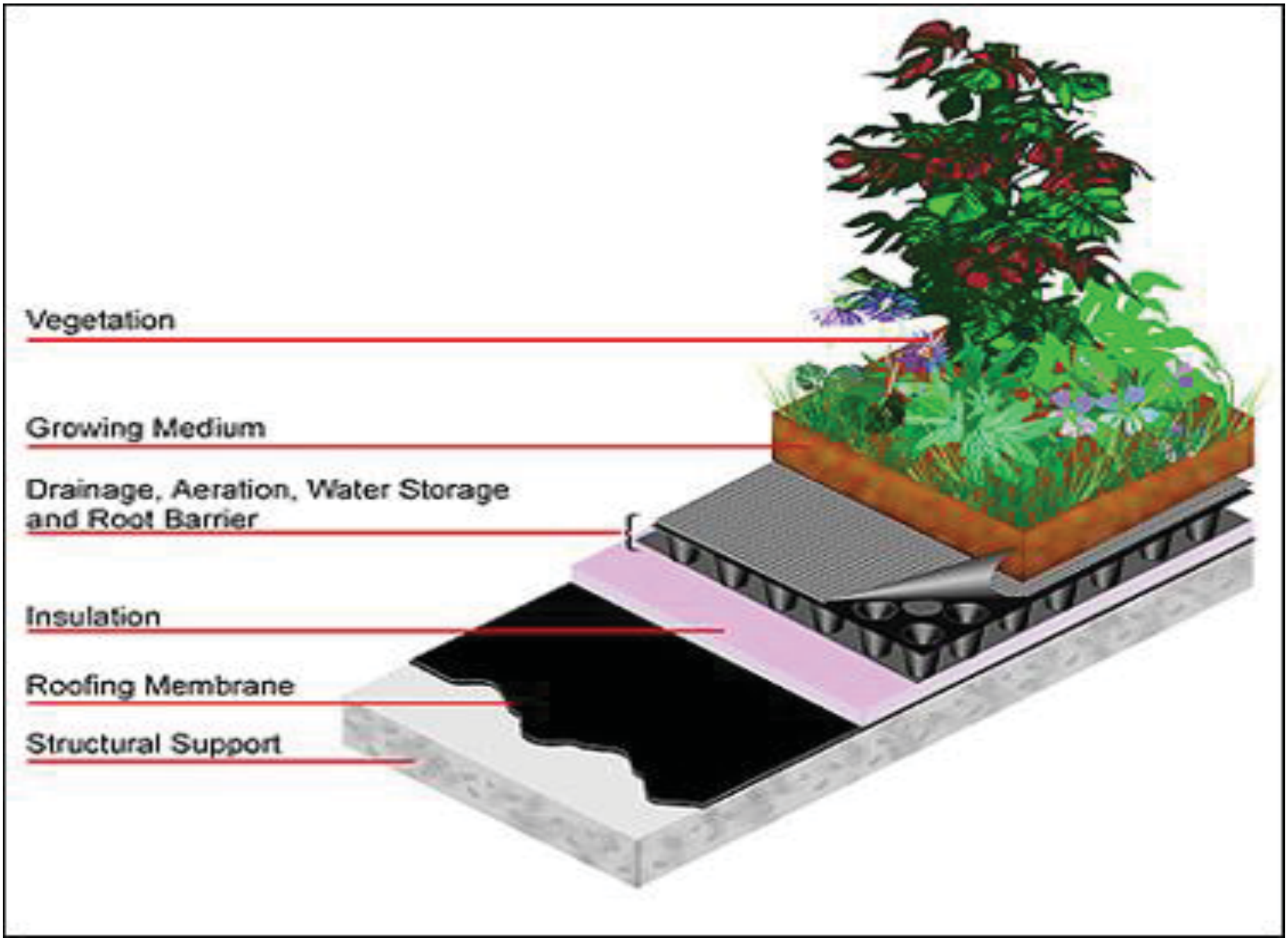



Vegetation
Growing Medium
Drainage, Aeration, Water Storage
and Root Barrier
Insulation
Roofing Membrane
Structural Support

Different well sizes and shapes

Water storage (retention) can be affected by technical solutions.

Roof angle	Small wells	Large wells	Difference
0°	7.4	11.5	55 %
8°	6.1	8.3	36 %
16°	5.0	7.1	42 %
32°	3.8	4.9	29 %


Vegetation
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H.M., Mæhlum T., **Sæbø A.**, 2017.
onse of *Phragmites* to fluctuating
ce water levels in constructed
ter management systems. Ecological
ring 106 (2017) 385–391.

ebø A., Stovin V., Hanslin H.M.,
edum root foraging in layered
oof substrates. Plant and Soil.
ed in June 2018.

Sedum spurium

Sedum rupestre

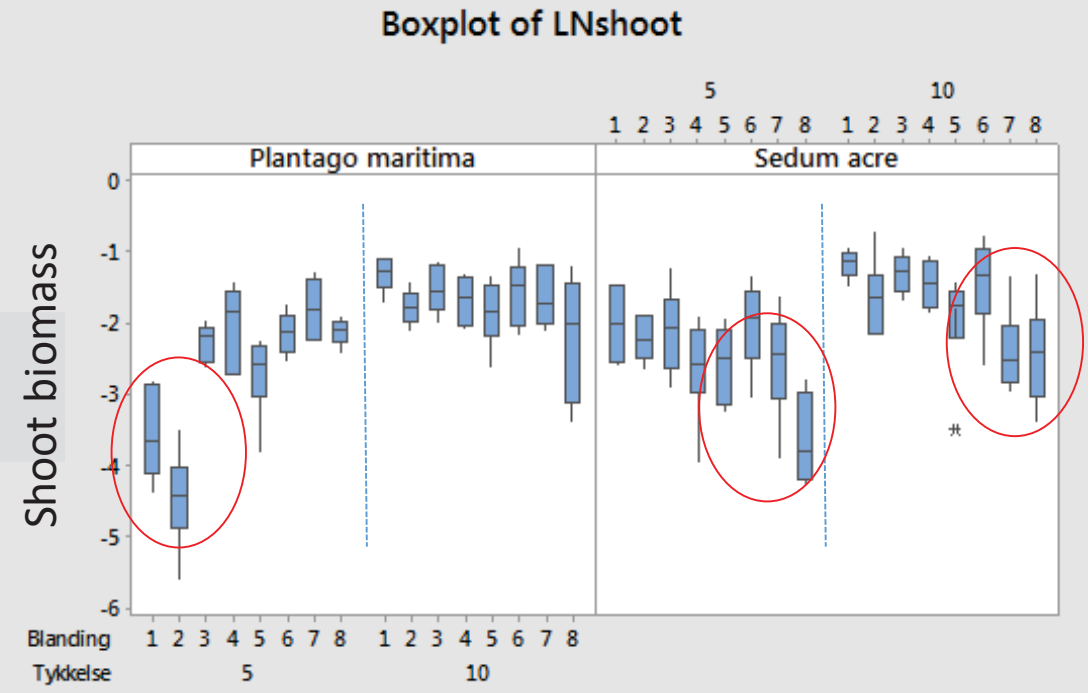
Sedum hispanicum

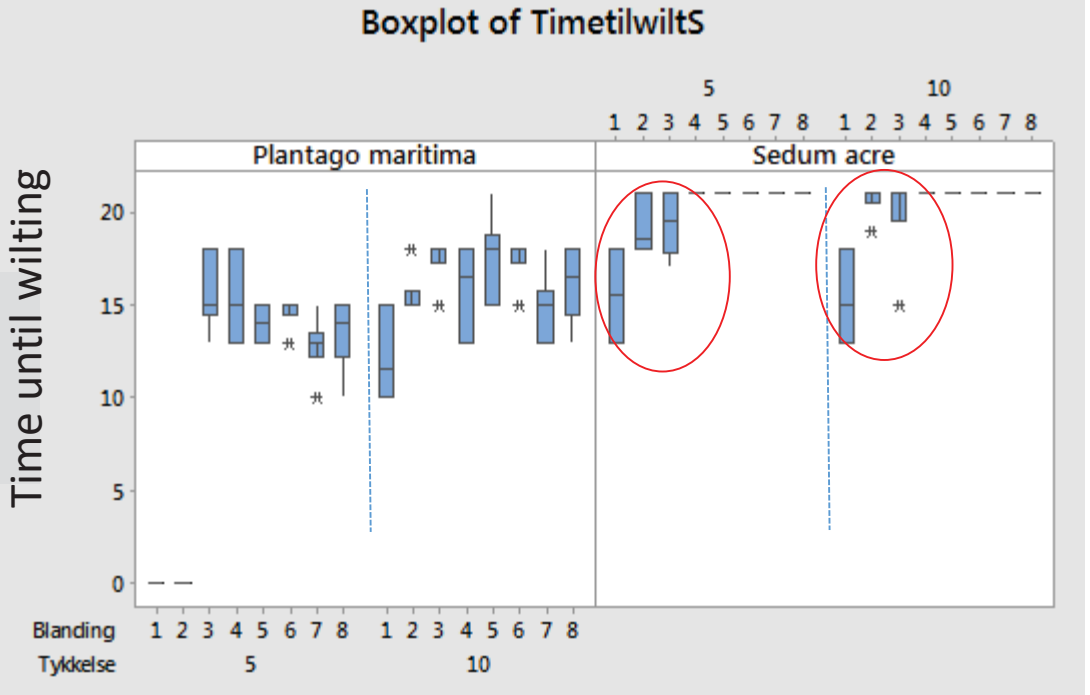
Sedum ochroleucum

Sedum anglicum

t growing substrate is very important for the growth of the plants on een roofs and thus, affecting water detention, aesthetical values and ect on biodiversity may.

quantities of biochar can have positive
t on plant growth. However, there are a lot
tors that we still don't know well enough.



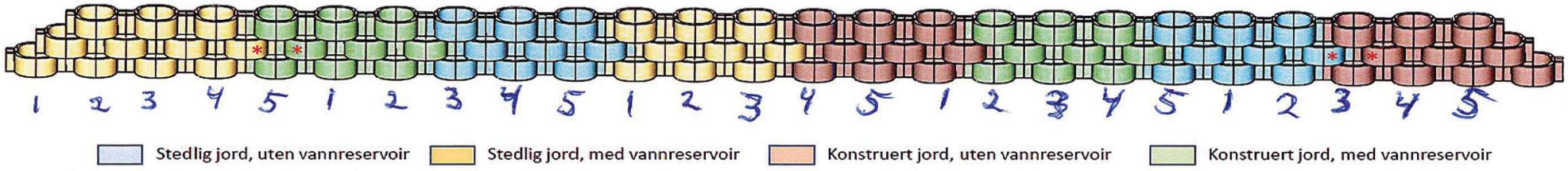


Testing of soil mixes, climbers and shrubs in a green wall

We want a large leaf area

Can the medium clean water?

Will the water detention and retention be of significance?



* 8 målepunkter for jordfuktighet og temperatur, på henholdsvis nord og sørside
Totalt 75 elementer av typen Skjævelandsmur, hver har ett rominnhold på 0,3 m³

1. *Hydrangea anomala* var Petiolaris
2. *Parthenocissus tricuspidata* 'Veitchii'
3. *Hedera helix*
4. *Parthenocissus* 'Inserta'
5. *Lonicera*

on needs from enterprises, we test
materials and technical green
ons: Indirect payment PES.

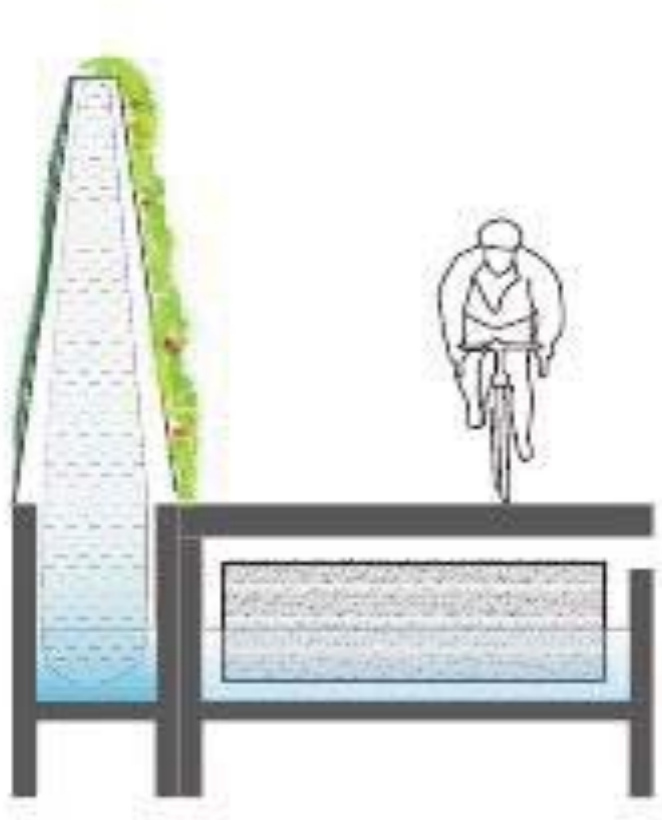
- Cement factory
- Nurseries
- Producers of green roof vegetation
- Machin enterpreneurs (soil mixes)

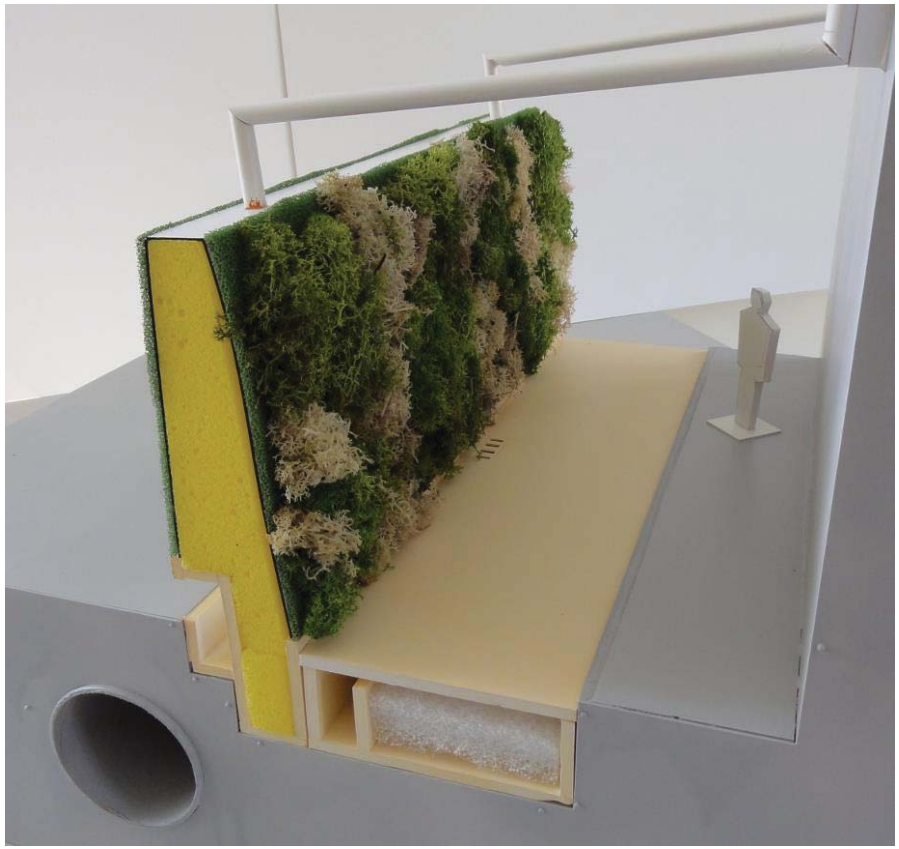
s:

veed free soils

petition between species must have attention when planning

Green walls in urban and dense cities



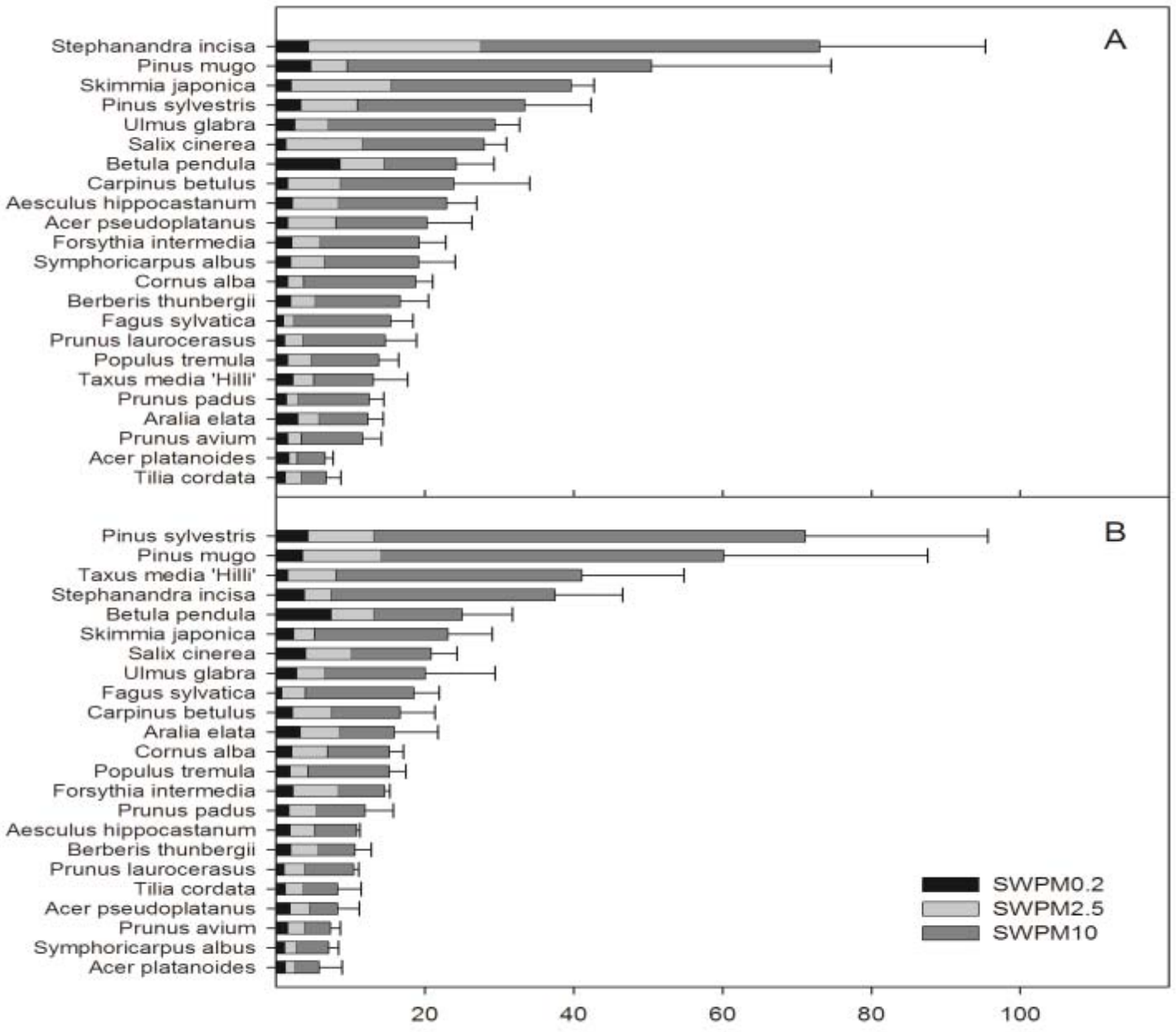


ding from the basics

ing technical and green solutions in urban areas will be an important
bution to decrease in costs, increase in ecosystem services, human well-being
ealth

PM deposition at roads


Leaves of average
small-leaved lime tree
in our study
(~3,5 m crown height)
accumulated:
4.81 g of PM
1.27 g of heavy metals
4.38 mg of PAHs



Accumulated deposition o
trees species. More than 1
difference. (A og B are diff
years).

Polish-Norwegian Research Fund

Science of the Total Environment 427–428 (2012) 347–354

Plant species differences in particulate matter accumulation on leaf surfaces

A. Sæbø, R. Popek, B. Nawrot, H.M. Hanslin, H. Gawronska, S.W. Gawronski

emonstrastration facilities as a part of the projects

asjonsanlegg overvannshåndtering
- blågrønne løsninger i Rogaland

FAKTAARK 1/2017

friområde, Stavanger

d drenering av om-
g samt grøntarealer
plasser og tursti
dering av Emmaus

Adresse: Rasmus Rises gate, Stavanger
Etablert: 2016
Størrelse: 380 m2
Prosjektering: COWI
Gjennomført av: TS Stangeland
Eier: Stavanger kommune
Kontaktperson: ...

to dammer i kjede. Disse er
som gir et permanent vann-
92 m2, opp til 0.5 m dyb-
met som en konstruert våt-
til 1 m dybde) med overlap
ingsnett. Dam 1 er tettet
g fiberduk i bunnen, mens
t og vil bidra til infiltrering

vervann fra hustak, plasser
t drenering og avrenning fra
lasser ved Rosendal syke-
t utgjør omtrent 51100 m².
rrenningskoeffisient er 0,4.
ert for en naturlig utsilting
g i tørrværsperioder. Mulig-
ning fra kommunalt nett er

er det et sumpområde med
re prydgress som stær, ulike
v kråkefot (Mecanthus),
m. En forlengelse av dam 2 i
ng etablert med matter fra
FA 8702 og Svenskeng, FA
1 er det en naturlig vende
rdilje, bekkeblom, fredløs,
b,og stær

INTENSE

nsify production, transform biomass to energy and novel goods and pro soils in Europe

etermine and harmonize methodologies for identification and recuperation of deg f specific degradation status

evelop, and optimize novel cropping systems, using precision agriculture and mode which are capable of

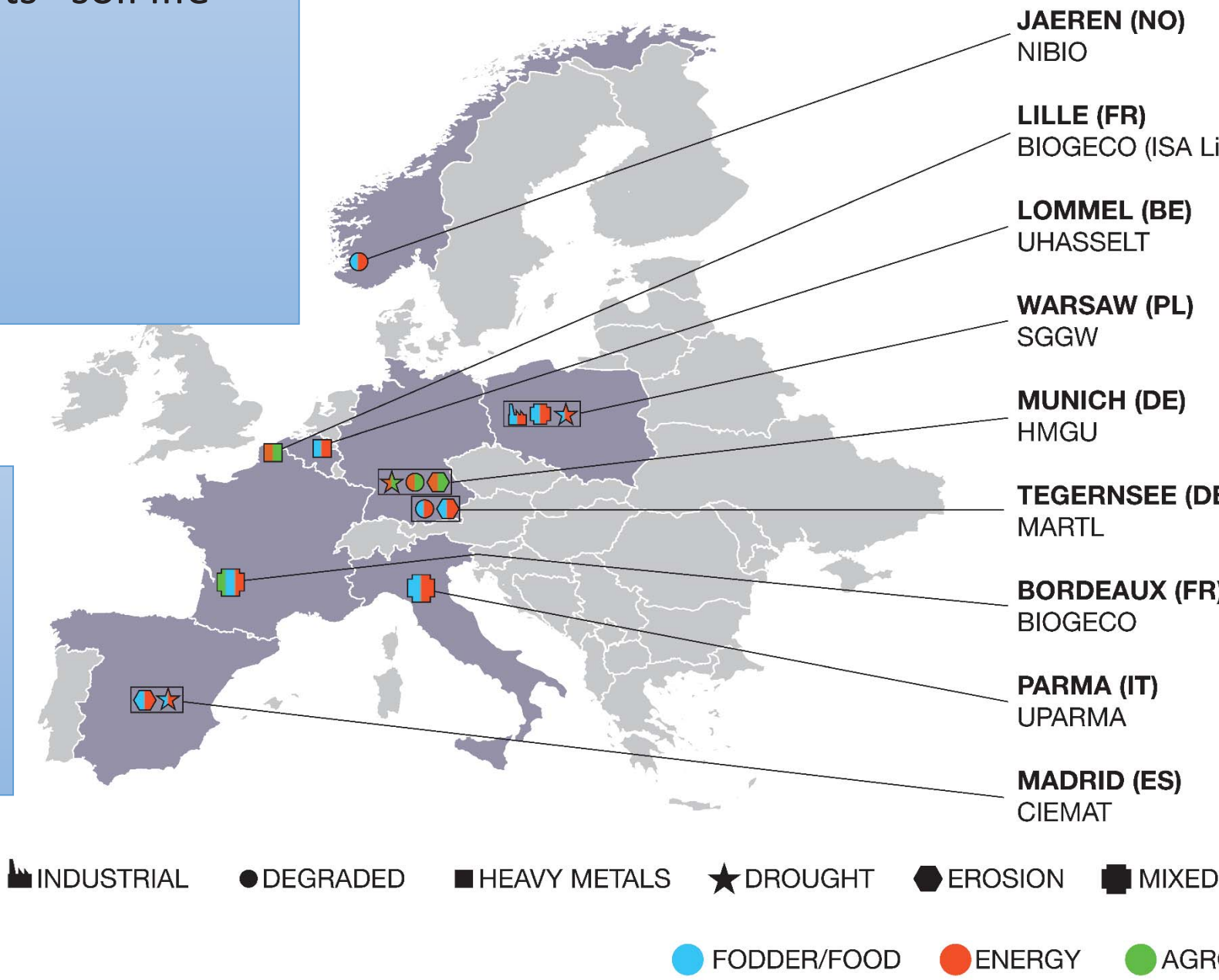
- 2.1 Increasing productivity
- 2.2 Increasing soil life and soil quality
- 2.3. Making use of specific amendments, to suppress pathogens and fertilize soils

evelop and implement suitable production systems applicable for land ameliorati ex degradation situations

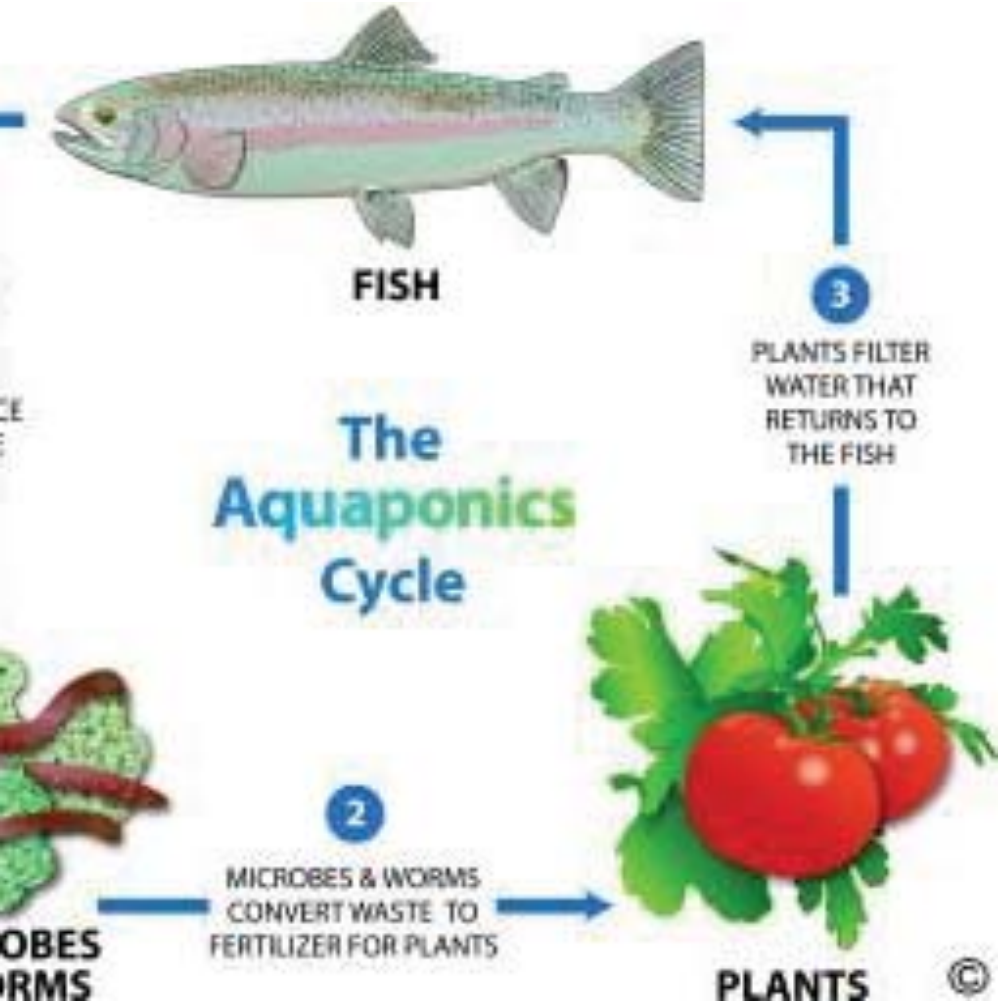
evelop and implement sustainable and financially attractive production alternative ction on recovered farm land

izers and amendments- soil life
ecuperation
st and biochar
quality
unctional groups
pecies

y production, transform
to energy and novel goods
ect soils in Europe - a
ow to mobilize marginal
cience of the Total
ment 616-617 (2018) 1101-

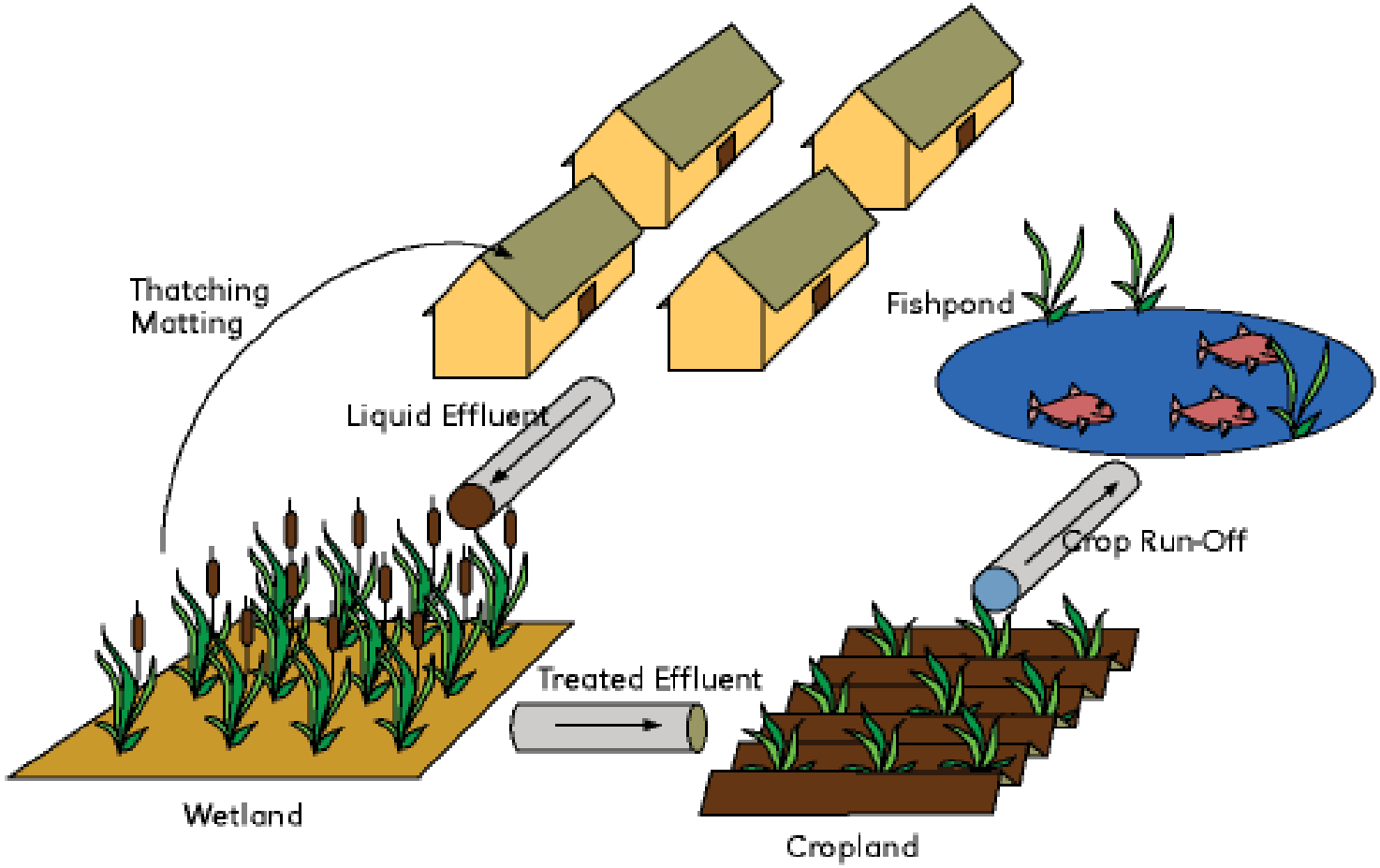


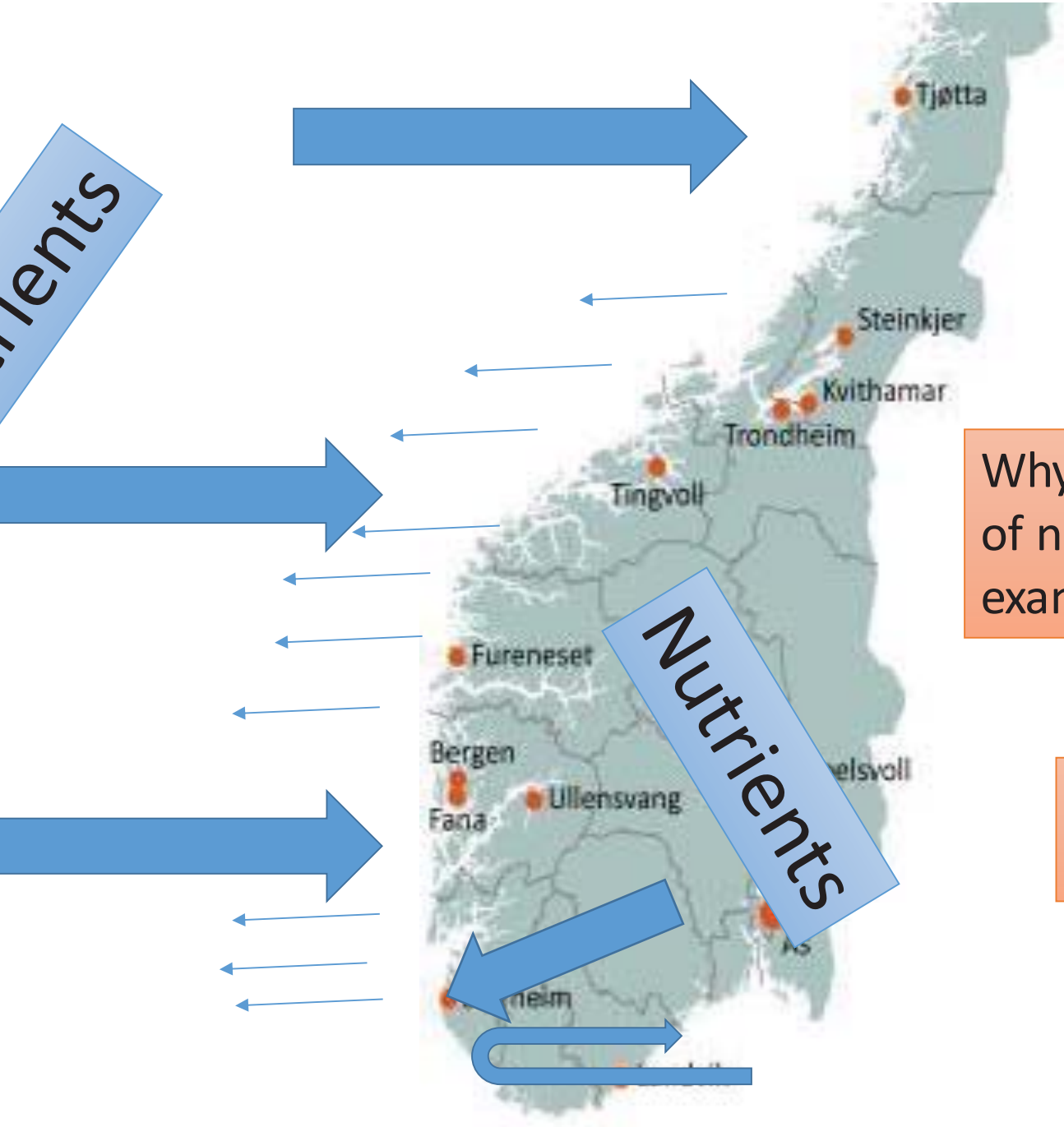
Aquaponics:



Old and new (adapted) systems for production of food is emerging. The n systems will be combined with tradit systems. There is a crucial need for innovative ideas in the search for EFFICENT, HIG-QUALITY and SUSTAIN methods.

ystem of ecological solutions may contribute to sustainable solutions





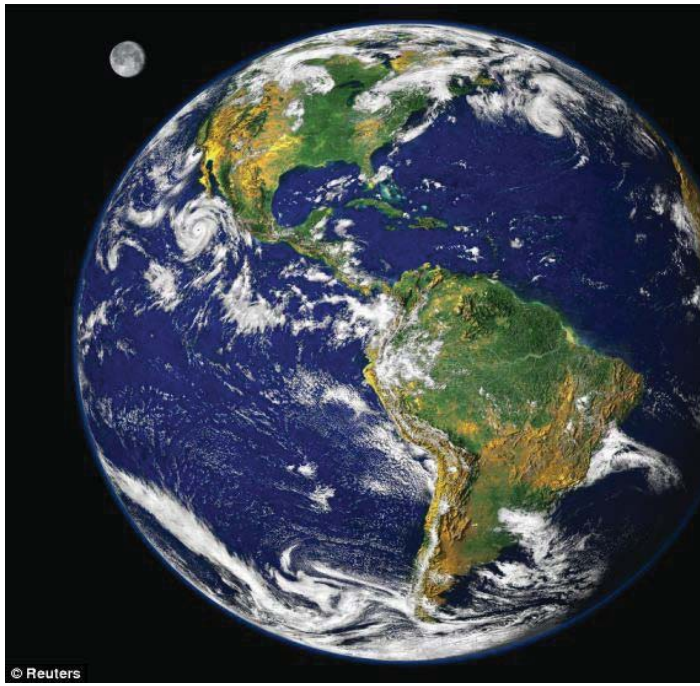
Why are the transport and streams of nutrients as they are? Norway as example:

Agriculture
Aquaculture

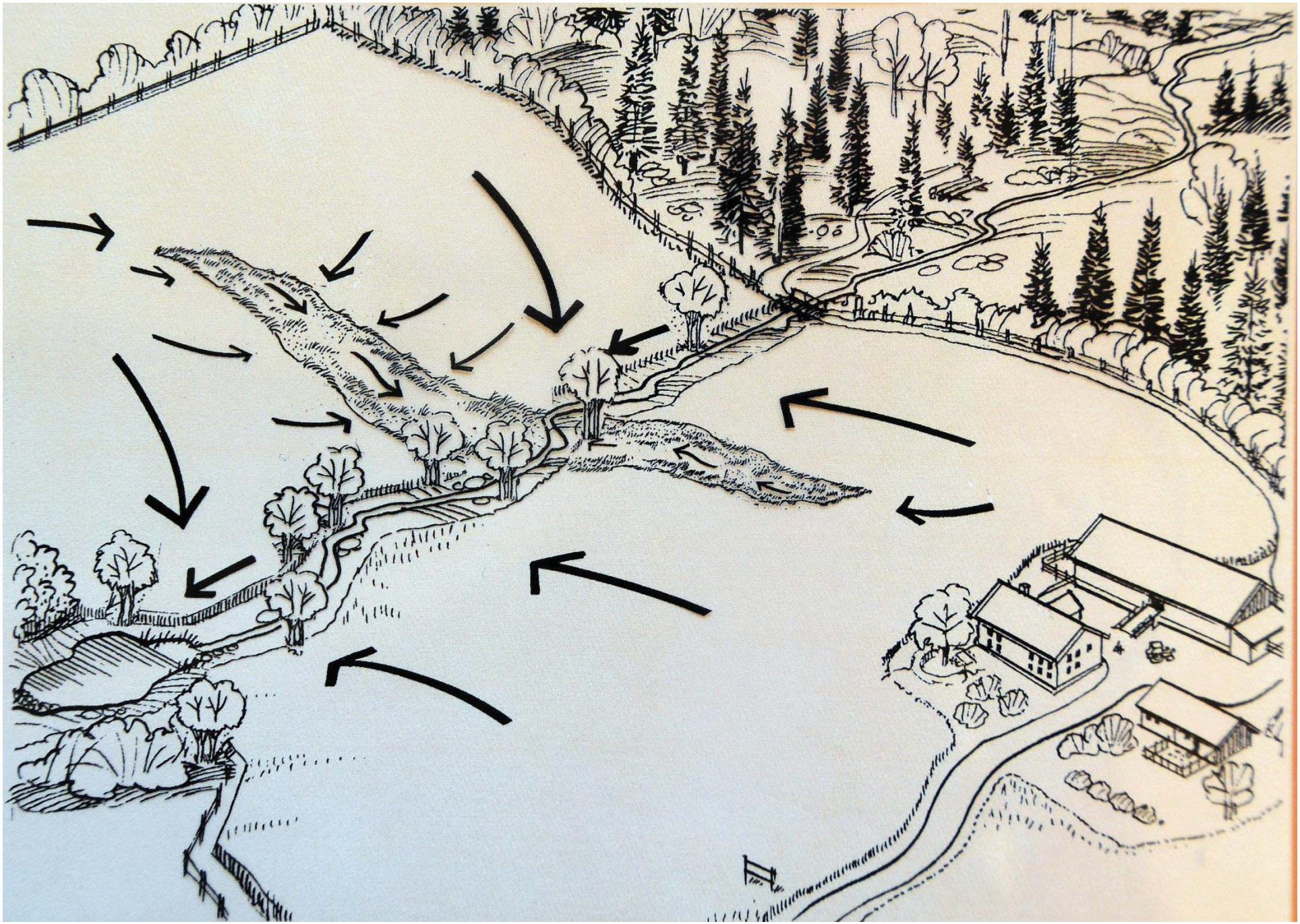
This is our and the farmers' responsibility

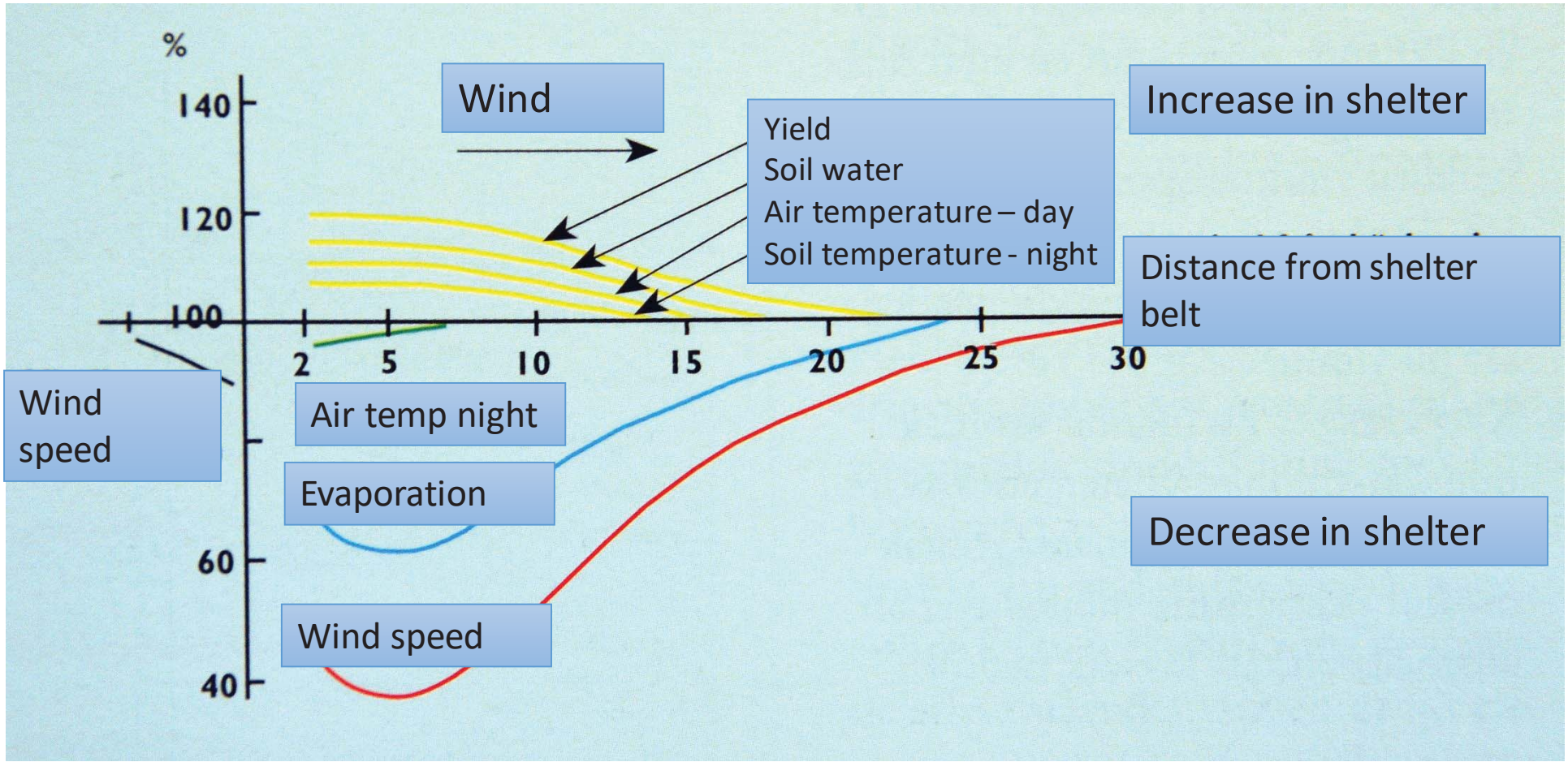
On farm

World and national policy



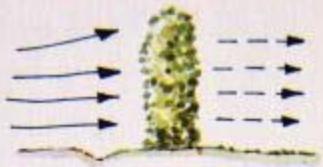
e collected a consortium based on 8 agriculture and
ning enterprises in Norway. We will apply for
of a project: Animal and fish manure; biogass,
r production, new products.




%
140
120
100
60
40
2
5
10
15
20
25
30
Wind
Yield
Soil water
Air temperature – day
Soil temperature - night
Increase in shelter
Distance from shelter belt
Wind speed
Air temp night
Evaporation
Decrease in shelter
Wind speed

Shelter belts

- Yield increase by 5 – 20 %
- Faster maturation
- Better quality
- Higher prices



Single row of trees, 50 – 70% opening;
Small filter effect

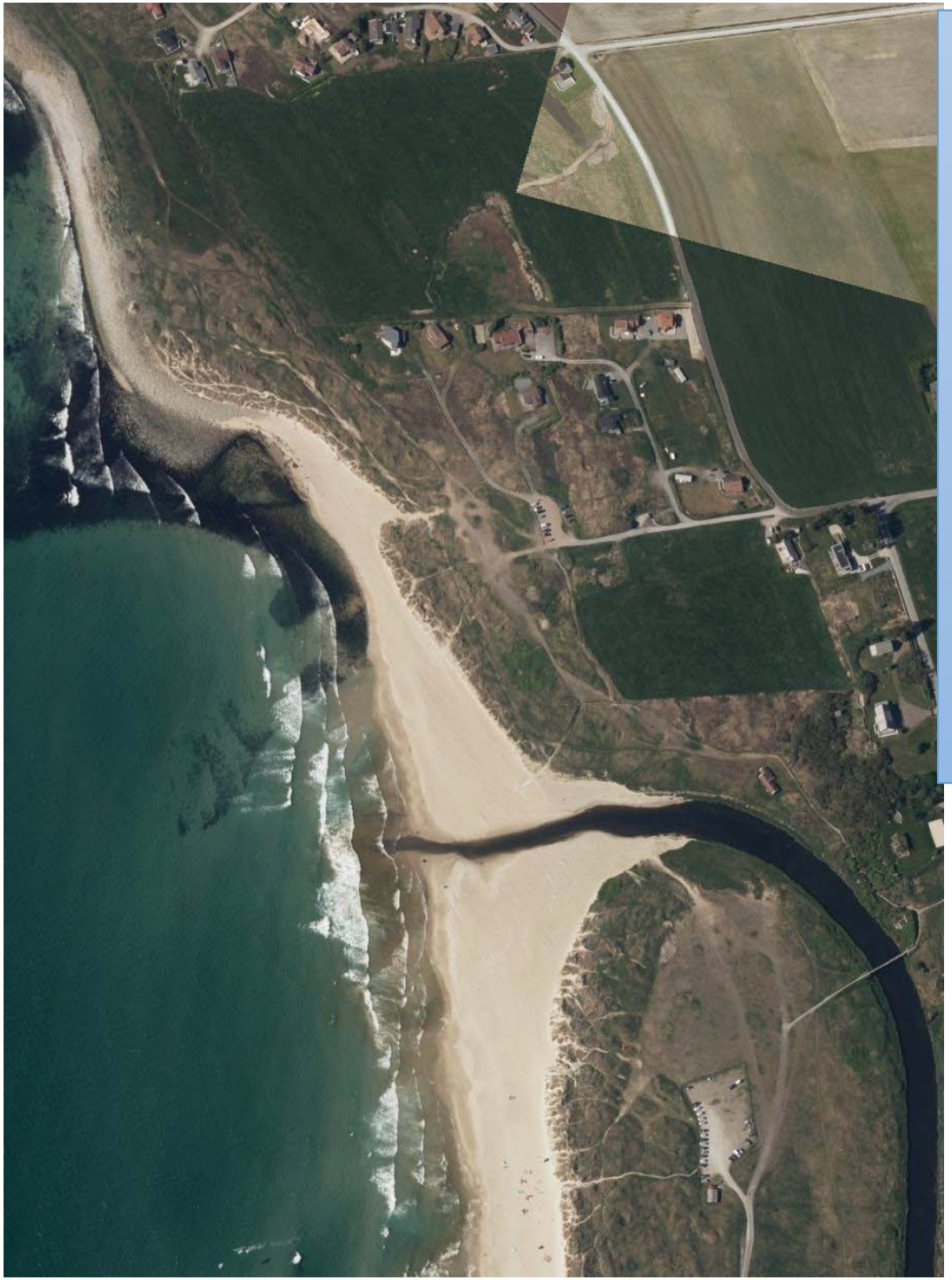
Compact low shrub vegetation: Small filtering effect

Ground cover, shrub layer, and trees; Optimal for filtering

Broad hedges with ground cover, shrub layer and trees in a mixture of ever green and deciduous species: Optimal for filtering and shelter.

Modifisert etter Gustavsson & Ingelög (1994)

Erosion control and vegetation establishment



The use of the landscape is in compet
between many actors:

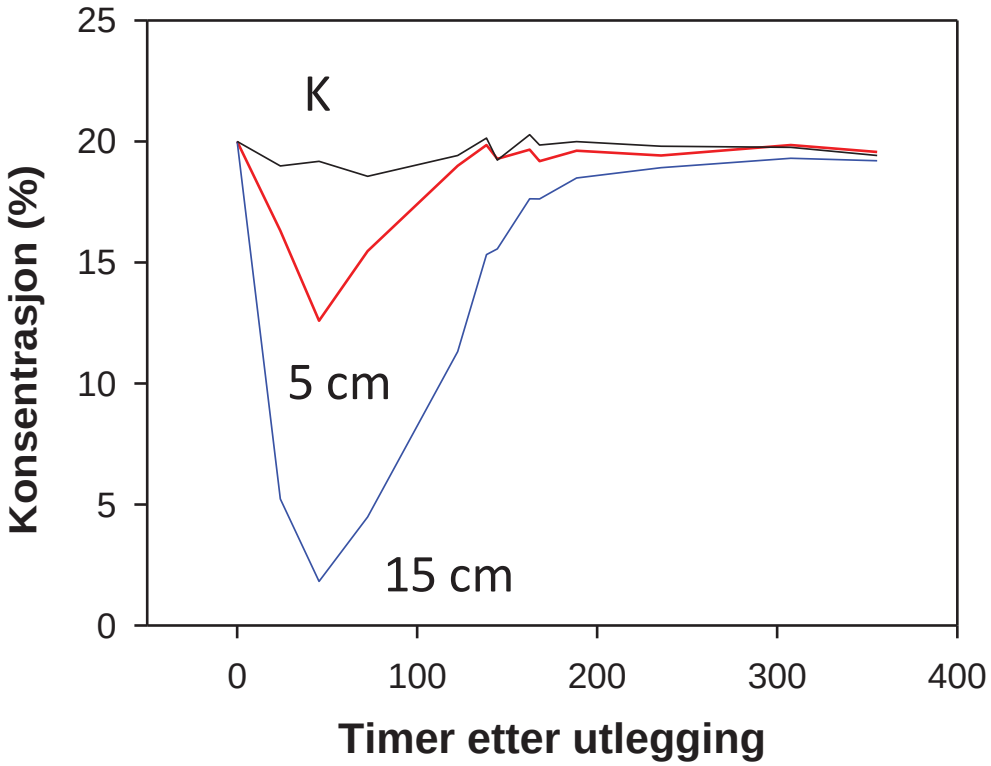
Agriculture, hunting, fisheries, miner
and mass excavations, sport - recreat
protected natural- and cultural areas.

The use of the landscape gives damag
the ecosystems.

How can we avoid or minimize dama

Low quality and mistakes in the use of compost can give serious consequences.
Three quantities of raw compost (not mature).

Oxygen concentration in the soil



Future cities will be green! In addition to high yield systems, the well-being and health of citizens are very important factors affected by the green infrastructure of urban areas. Recirculation of water and nutrients can be improved by combining green and technical solutions.