# CIRCULAR PEAT LANDSCAPE

## a spatial framework based on circular agriculture to relieve peat oxidation in the 'low midlands' in Friesland, the Netherlands


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Urban Ecology


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LANDSCAPE ARCHITECTURE

# Motivation

The Netherlands

Friesland, The Netherlands

Low midlands, Friesland, the Netherlands

Figure 1. Location Research
Sources: Kadaster (2022)

# Characteristics agriculture practices











Figure 2. Collage of photos taken in the low midlands
Sources: made by author

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# 1. Scope

# Peat oxidation

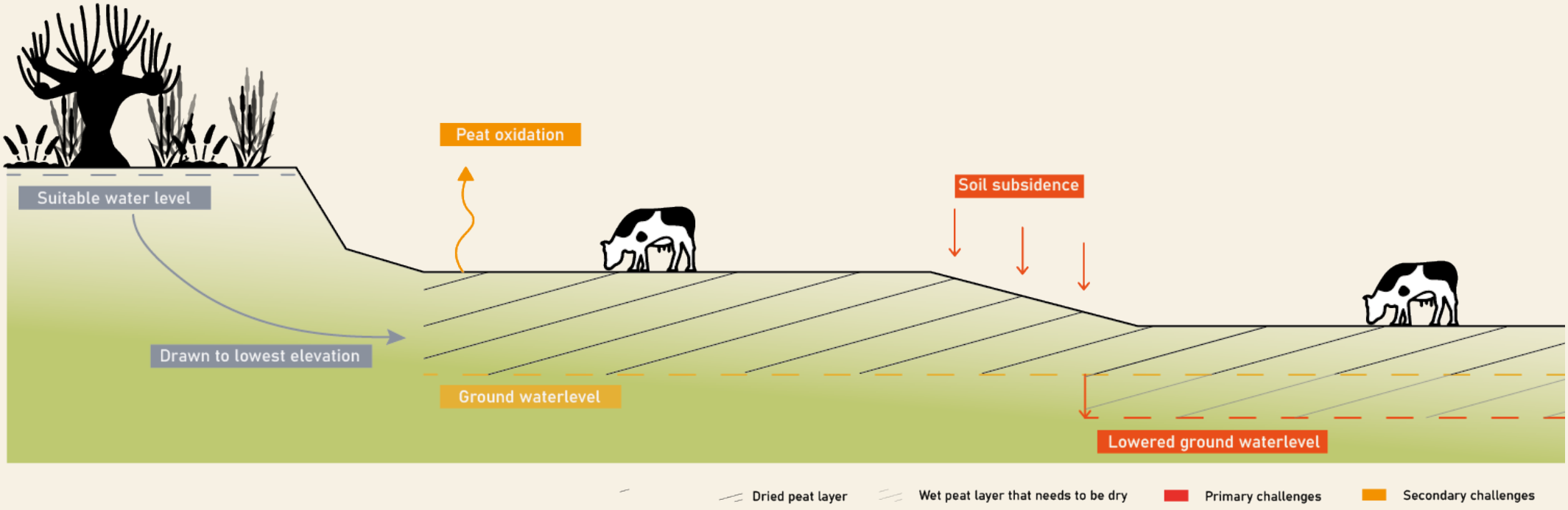
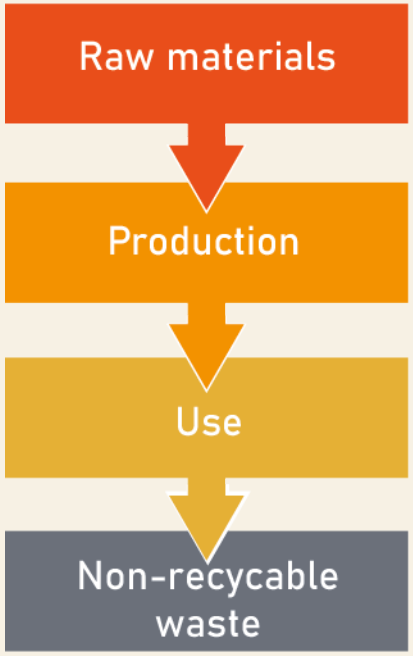


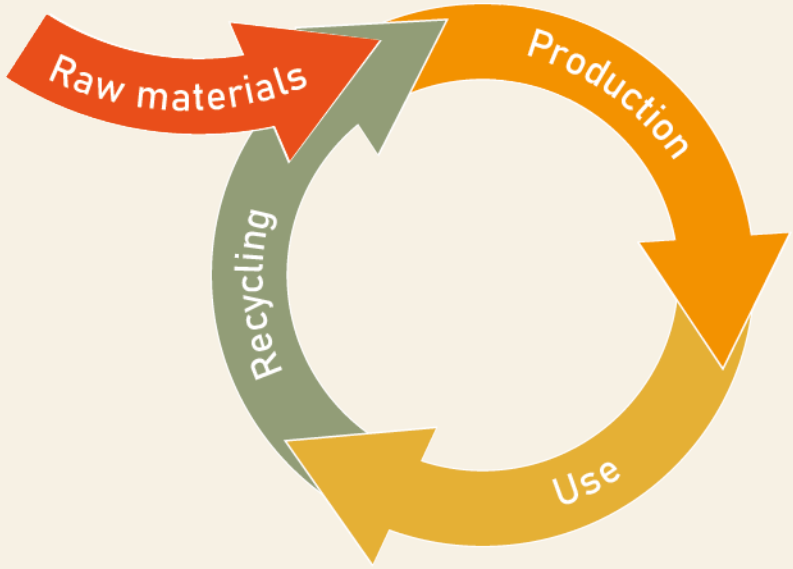

Figure 3. Peat oxidation due to agriculture
Sources: made by author

# Circular economy

## Lineair economy




## Circular economy




## Agricultural land cover in Friesland


Figure 4. Differences economic systems
Sources: Adapted from Volksbank (2023)

# Circular agriculture connection to nature

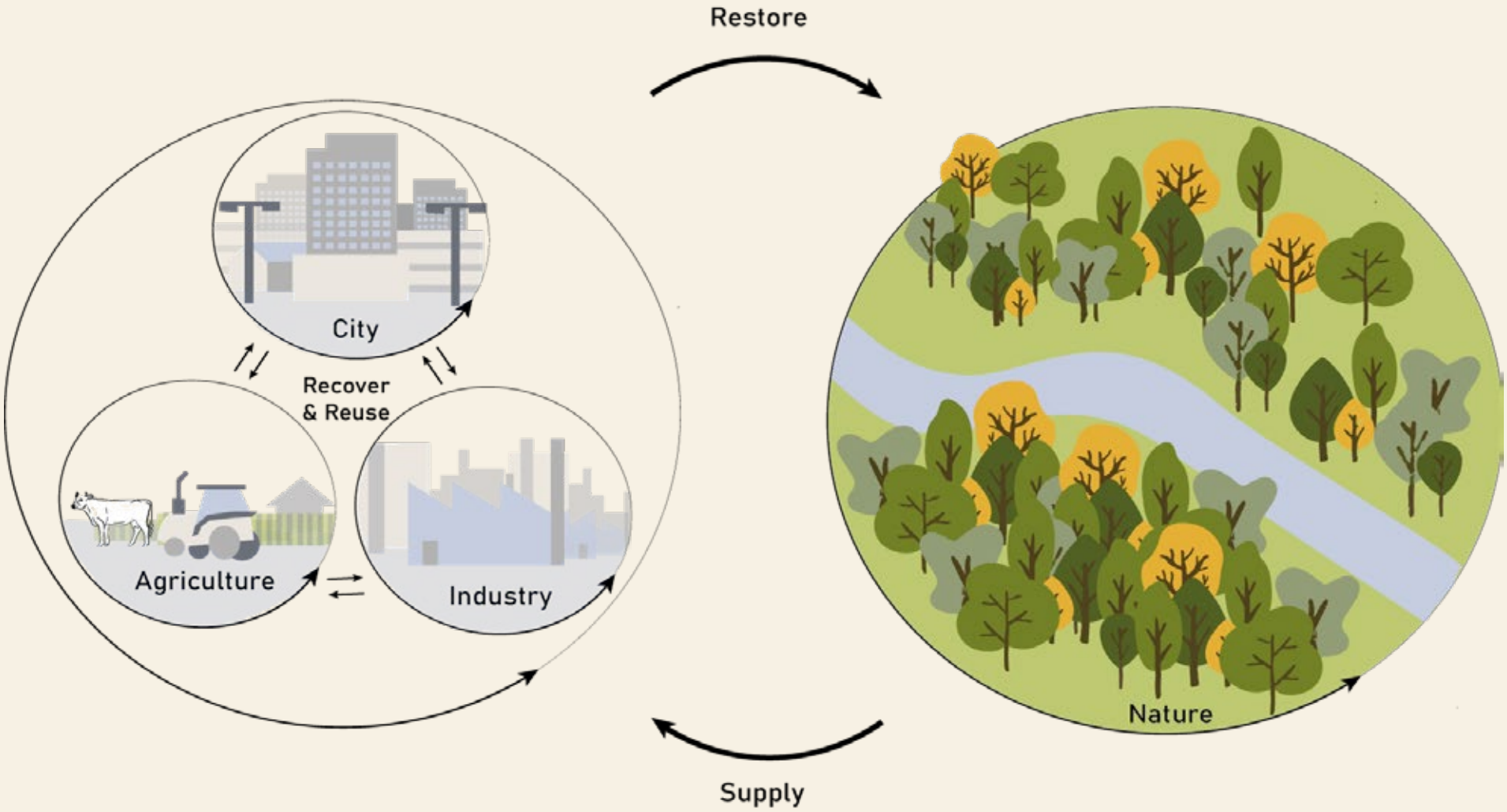



Figure 5. Circular economy and the role of Nature and Agriculture
Sources: Adapted from World Bank Group (2021)

# Connection of current economic systems

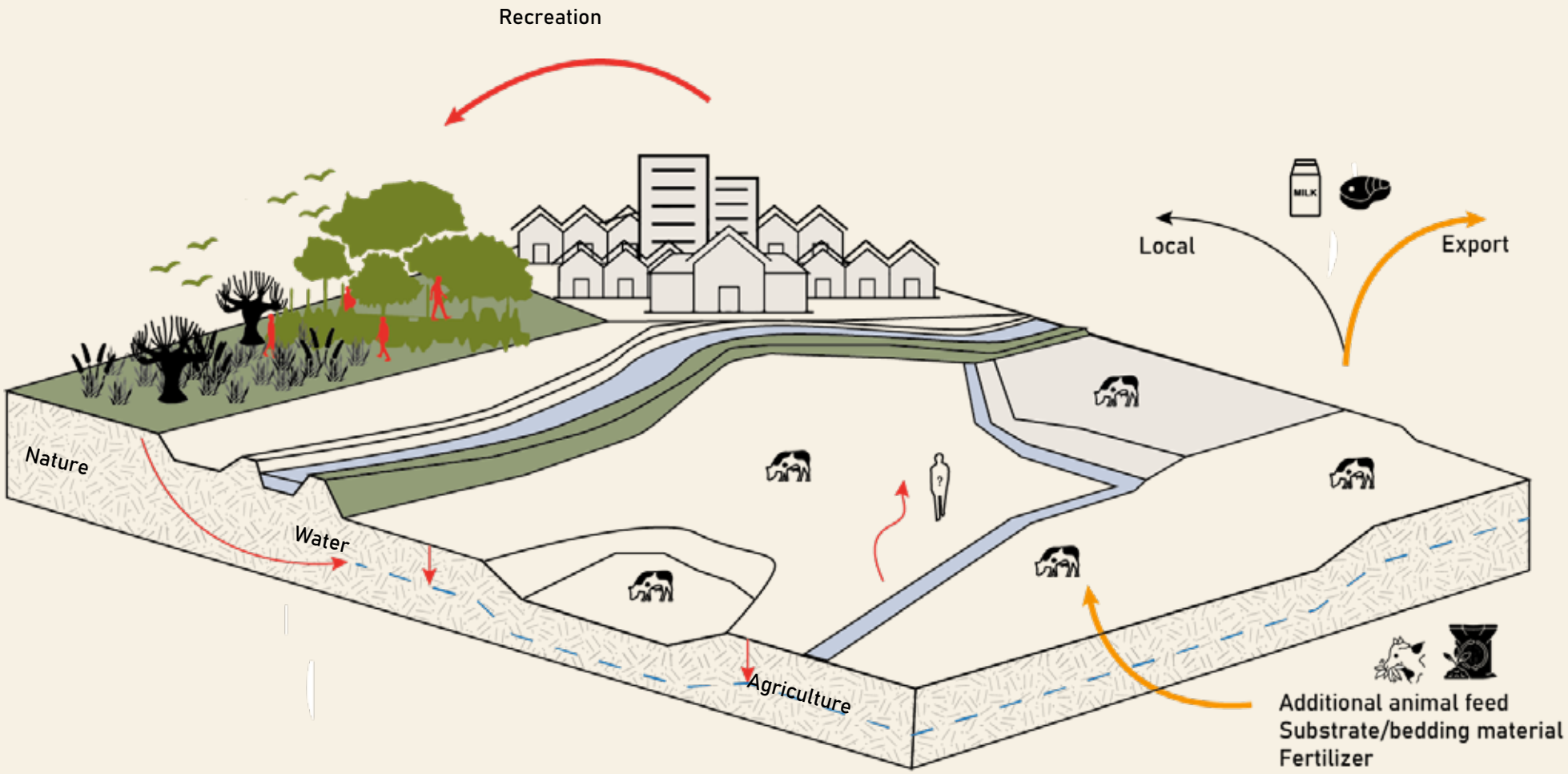



Figure 6. Current agricultural system
Sources: made by author

# Research questions

## Hypothese

Circular agriculture practices will relieve the peat oxidation in the ´low midlands´ in Friesland, the Netherlands.

## Research question

What is the spatial framework based on circular agriculture to relieve peat oxidation in the 'low midlands' in Friesland, the Netherlands?

**Subquestion 1**
"What are the characteristics of the peat landscapes in the low midlands, Friesland, the Netherlands?"

**Subquestion 2**
"What agriculture practices have the potential of relieving peat oxidation?"

**Subquestion 3**
What is the relation of the agriculture practices that relieve peat oxidation to the circular agriculture system?

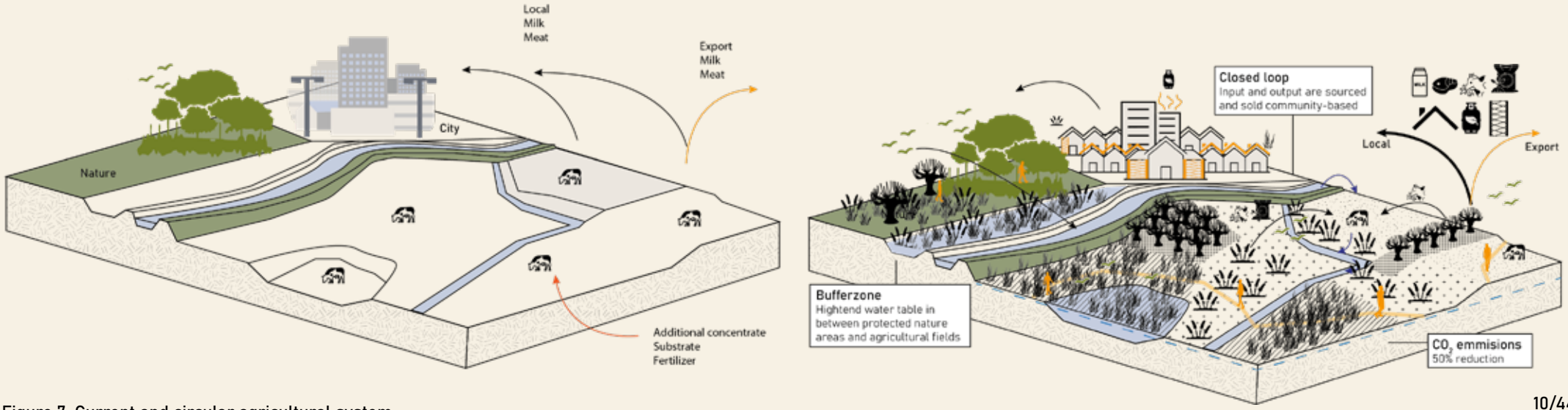



Figure 7. Current and circular agricultural system
Sources: made by author

# Methodology

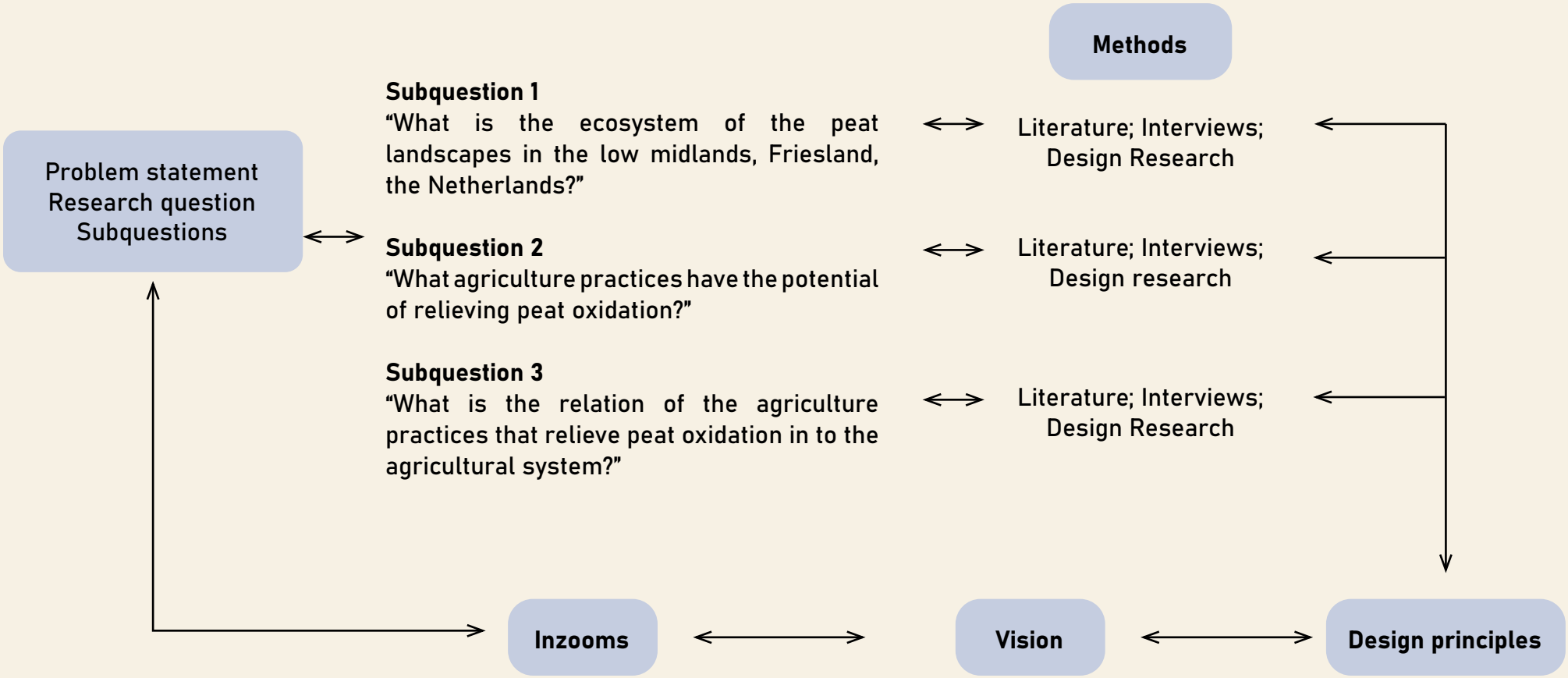



Figure 8. Methodology
Sources: made by author

# 2. Characteristics of the peat landscape

Interactions in the peat landscape

Vision

# Growth of peat landscapes

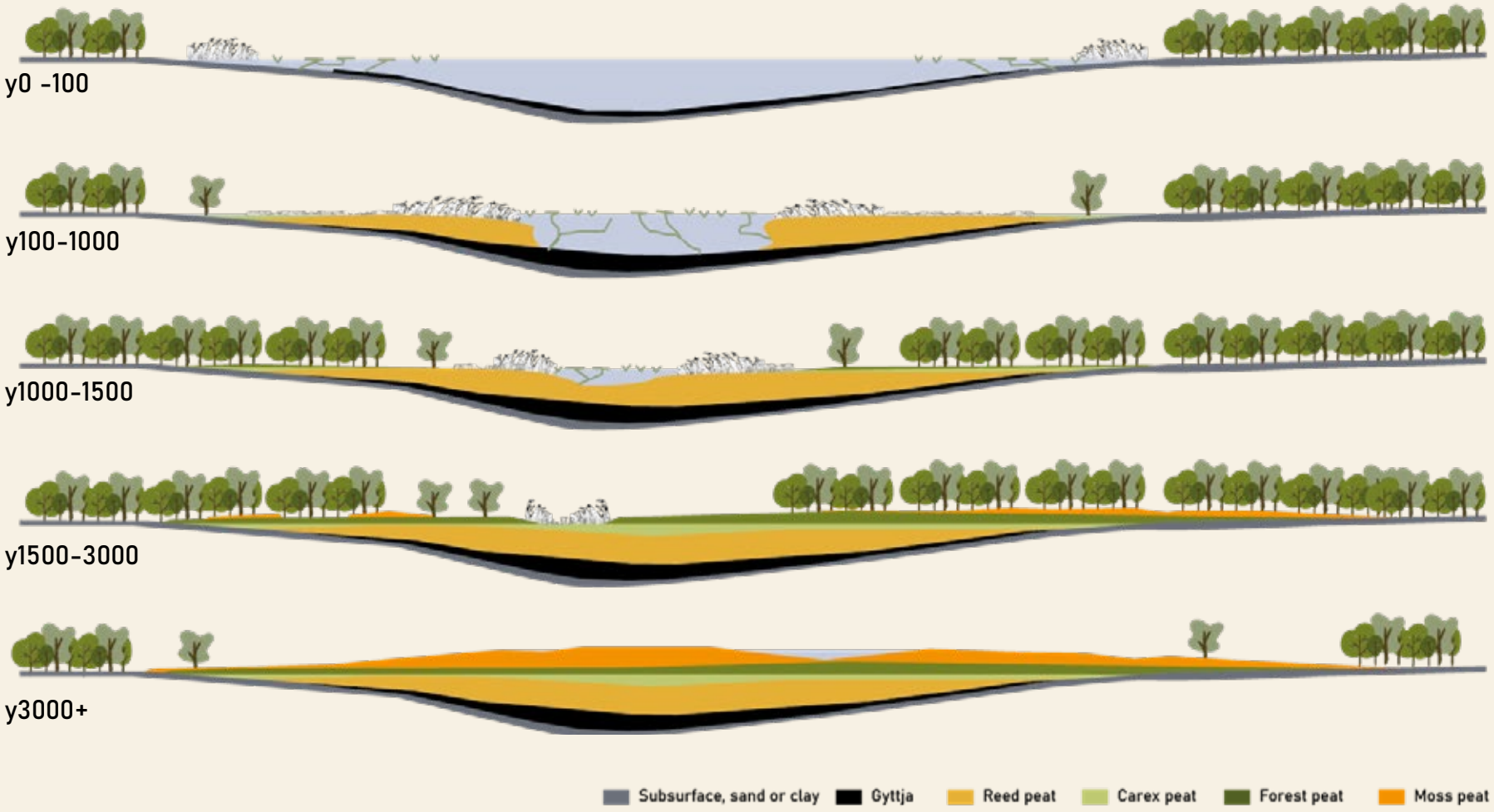
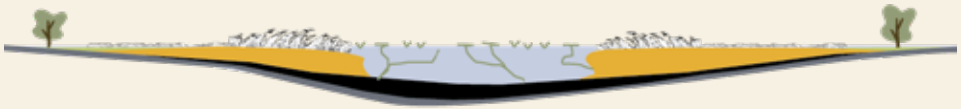



Figure 9. Succesion peat strata
Sources: Adapted from Encyclopedie Drenthe (z.d.)

# Ecotypes in peat landscape

## Reed peat stratum



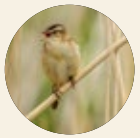
## Carex peat stratum

## Forest peat stratum

## Reedland / Reedswamp

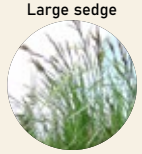
Root vole

Reed Warbler



Bittern

*Carex riaria*
Large sedge

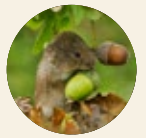


*Typha latifolia*
Cattail

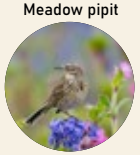
*Phragmites australis*
Reed

## Molinia meadow

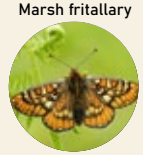
Field vole



Meadow pipit



Marsh fritallary



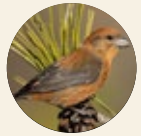
*Molinia caerulea*
Purple moor-grass

*Narthecium ossifragum*
Bog asphodel

*Carex spec.*
Sedge

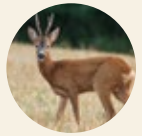
## Bog woodland

Crossbill



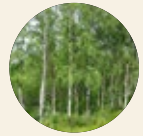
Woodcock

Roe deer



*Sphagnum spec.*
Peat moss

*Betula spec.*
Birch



*Salix spec.*
Willow

Figure 10. Overview ecotypes per peat strata

Sources: EEcopedia (2024); It Fryske Gea (2019); Zuidhollandslandschap (n.d.); Trunk (n.d.); Kranenborg (n.d.); Vijverplantenland (n.d.); istockphotos (2023); Brittannica (2017); freenatureimages (n.d.); flickr (n.d.); sciotogardens (2020); woodlandtrust (n.d.); rspb (n.d.); butterfly-conservation (n.d.); Wikipedia (2024); Tsel (n.d.); Meyer (2018); britannica (n.d); Hefele (n.d.); treeguideuk (2020)

# Heritage related to peat in the low midlands


Source: www.friesland.nl/nl/dorpen/drachten


Source: Udo Ockema (wikipedia)


Source: Rove (2020)


Source: made by author


Source: Fred Kok (2018)



Figure 11. Relation heritage of the low midlands to water and the peat landscape

# Heritage related to peat in the low midlands

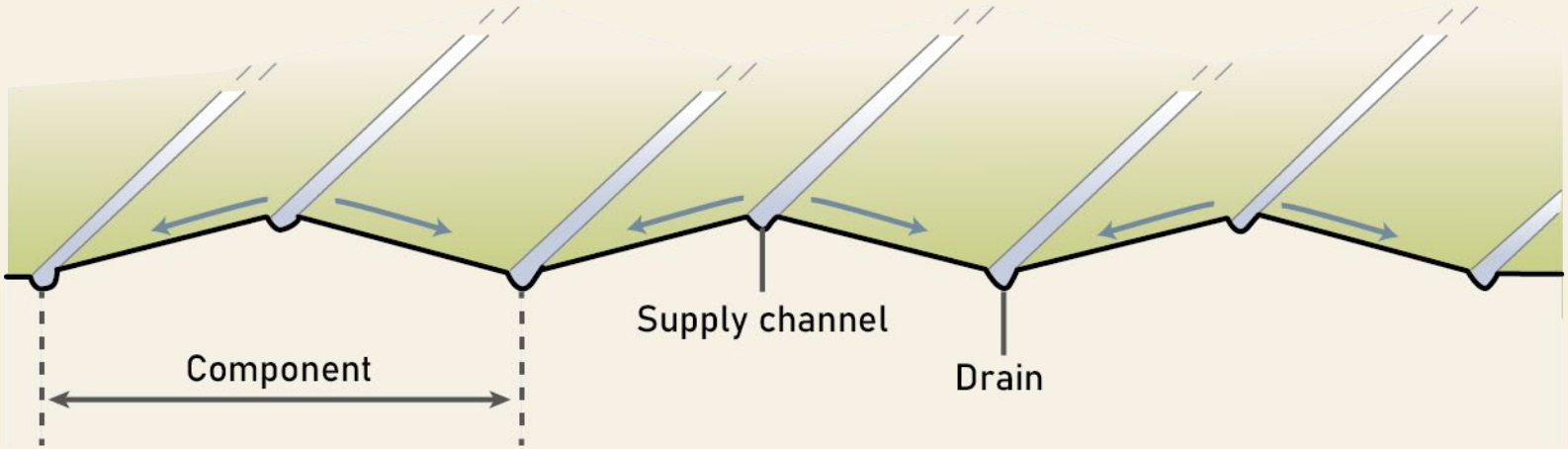



Figure 12. Heritage inudation system
Sources: adapted from Leibundgut & Vonderstrass (2016)

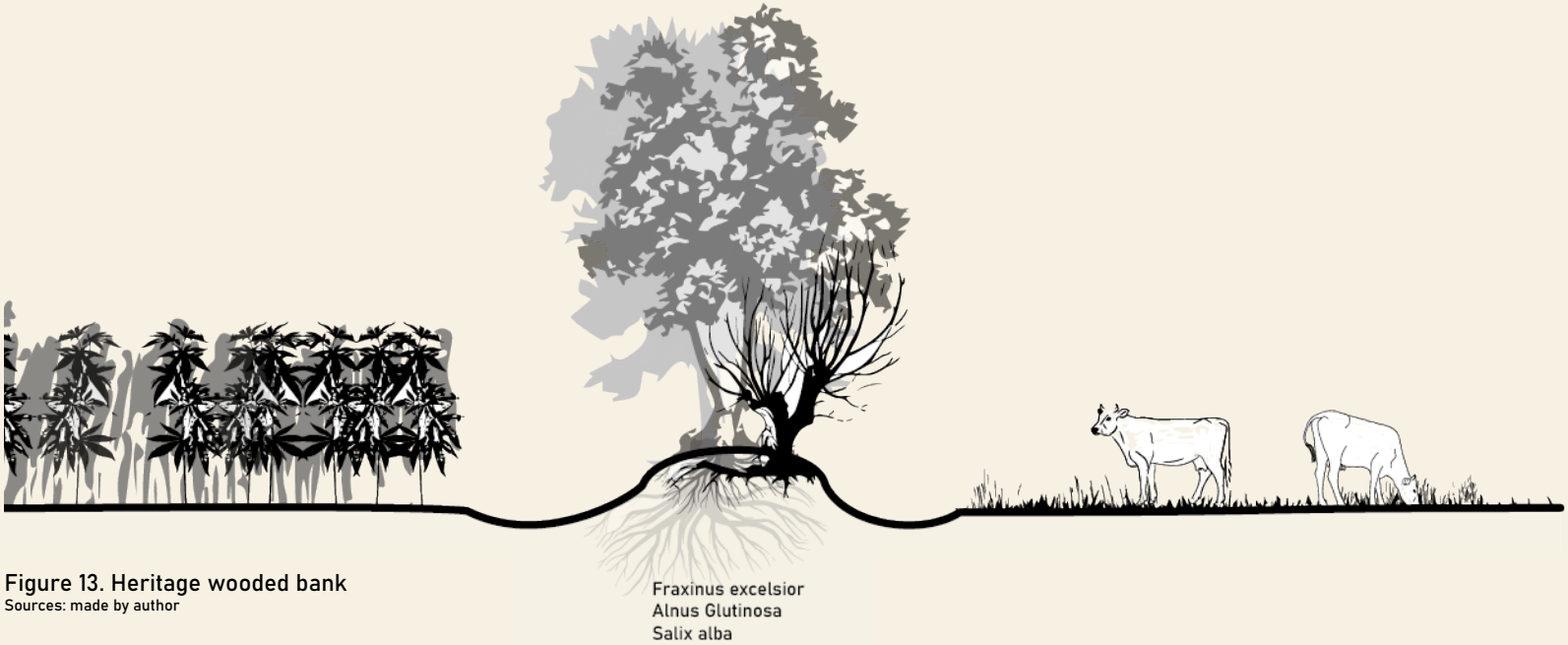



Figure 13. Heritage wooded bank
Sources: made by author

# Vision for the low midlands

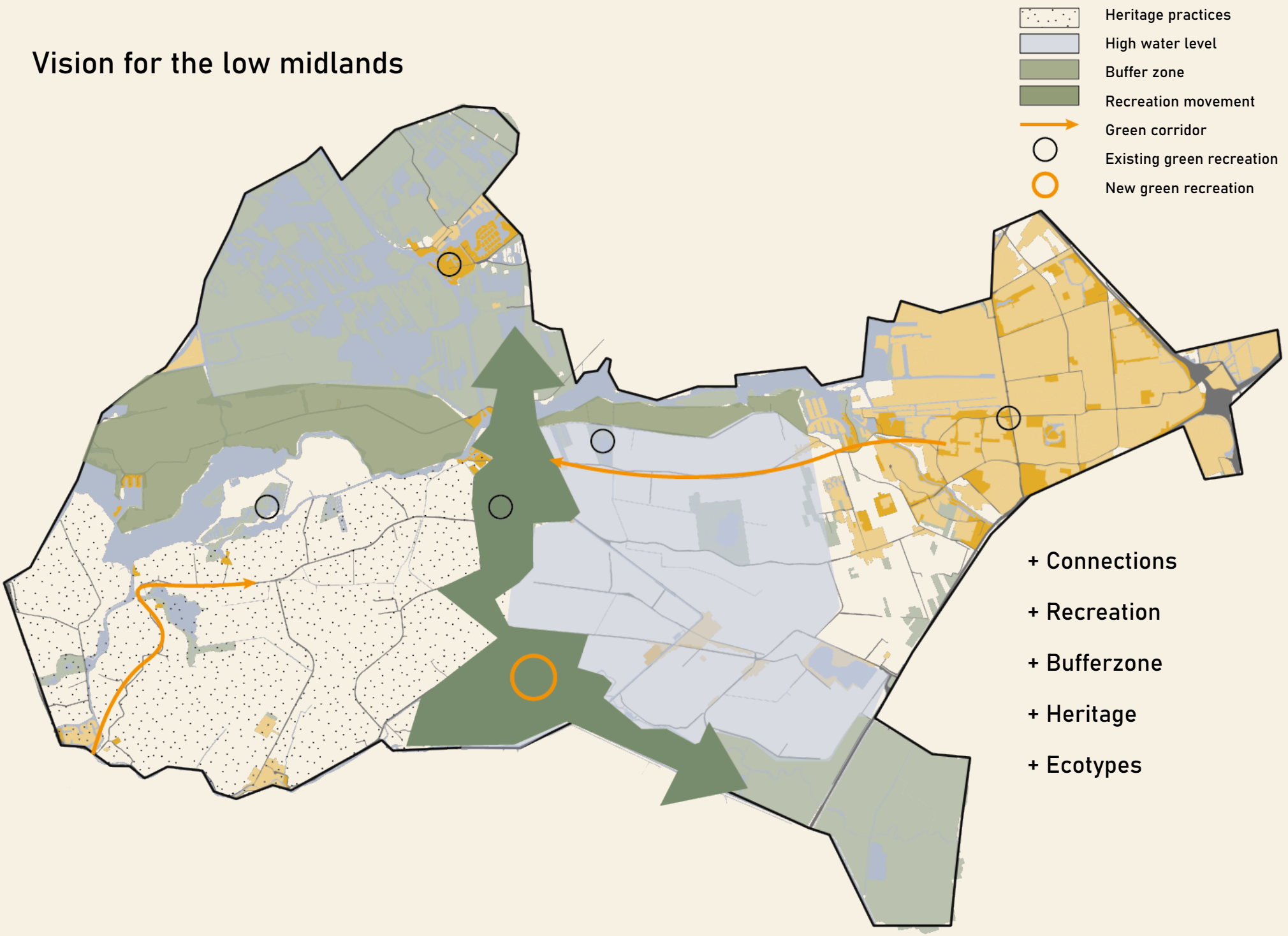



Figure 14. Vision for the low midlands
Sources made by author

# 3. Agriculture practices against peat oxidation

Water level to prevent peat oxidation

Characteristics agriculture practices

# Water level to prevent peat oxidation


Figure 15. Average year-round water level for no peat oxidation
Sources: made by author

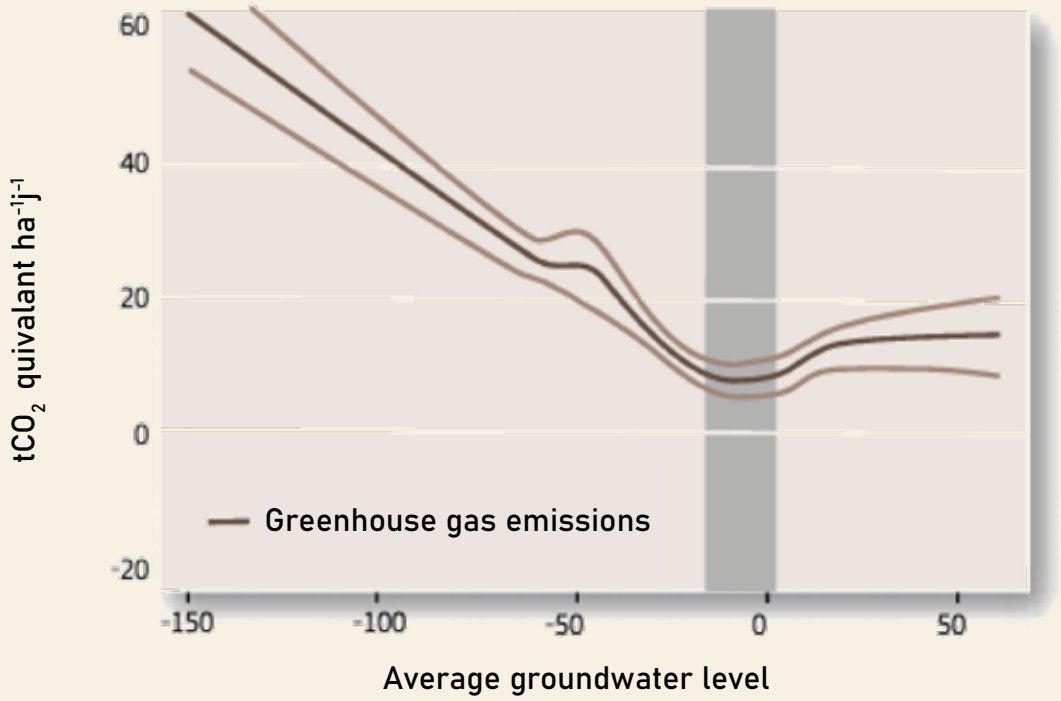



Figure 16. Water level effect on total greenhouse gas emissions
Sources: Jurasinski et al. (2016)

# Characteristics agriculture practices

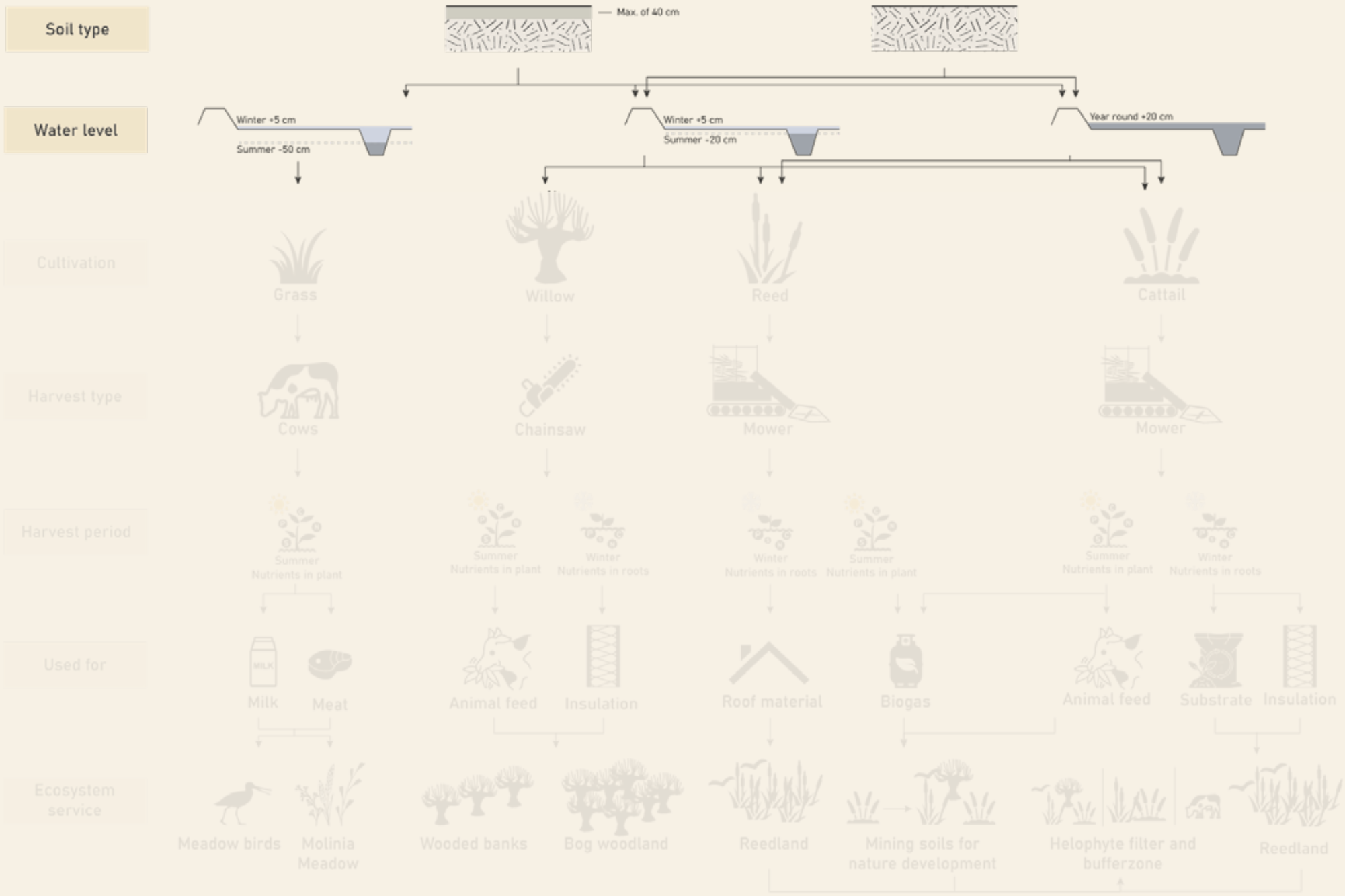





Figure 17. Relation agriculture practices to ecosystem and end use
Sources: made by author

# Characteristics agriculture practices

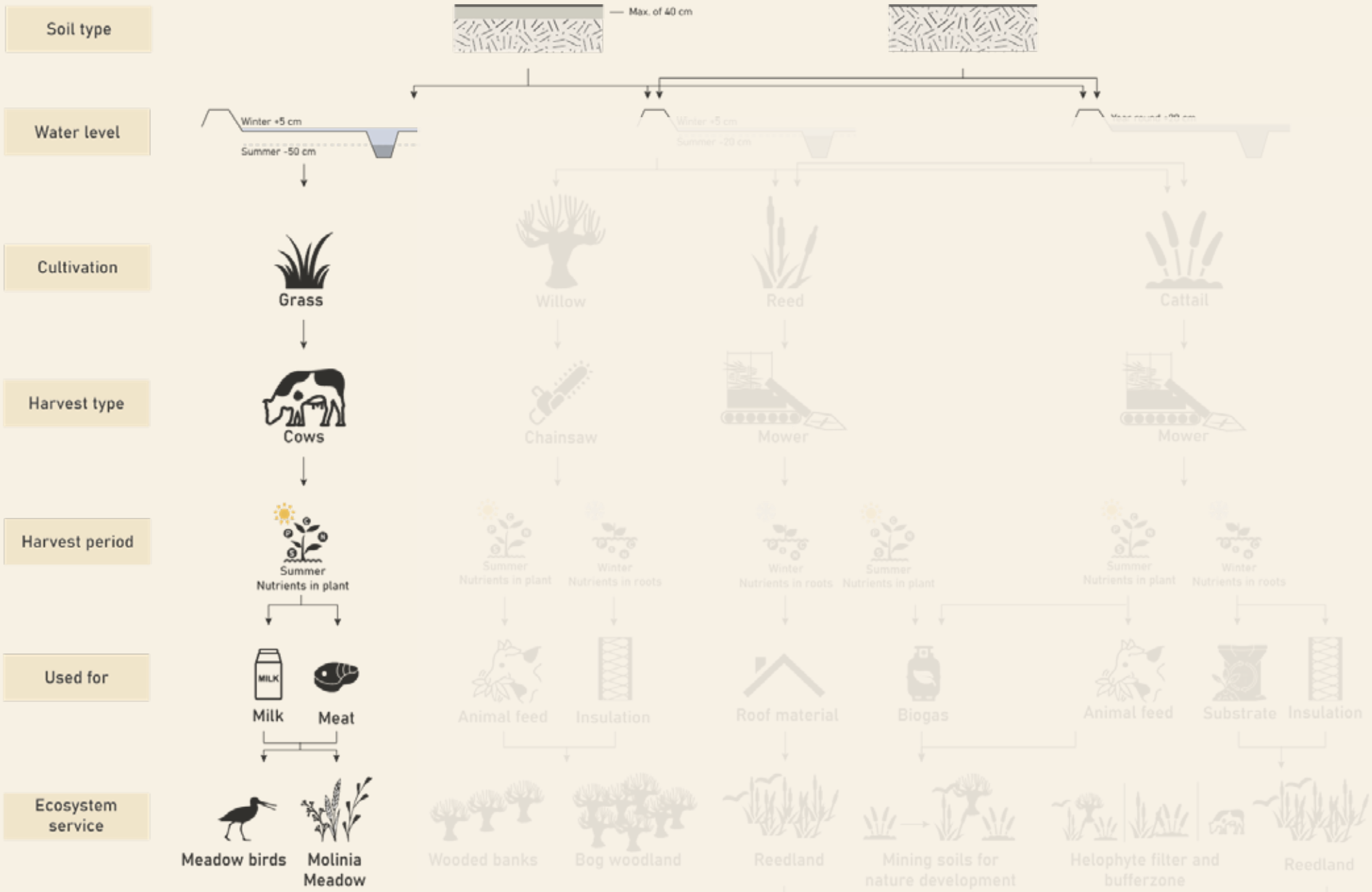





Figure 17. Relation agriculture practices to ecosystem and end use
Sources: made by author

# Characteristics agriculture practices

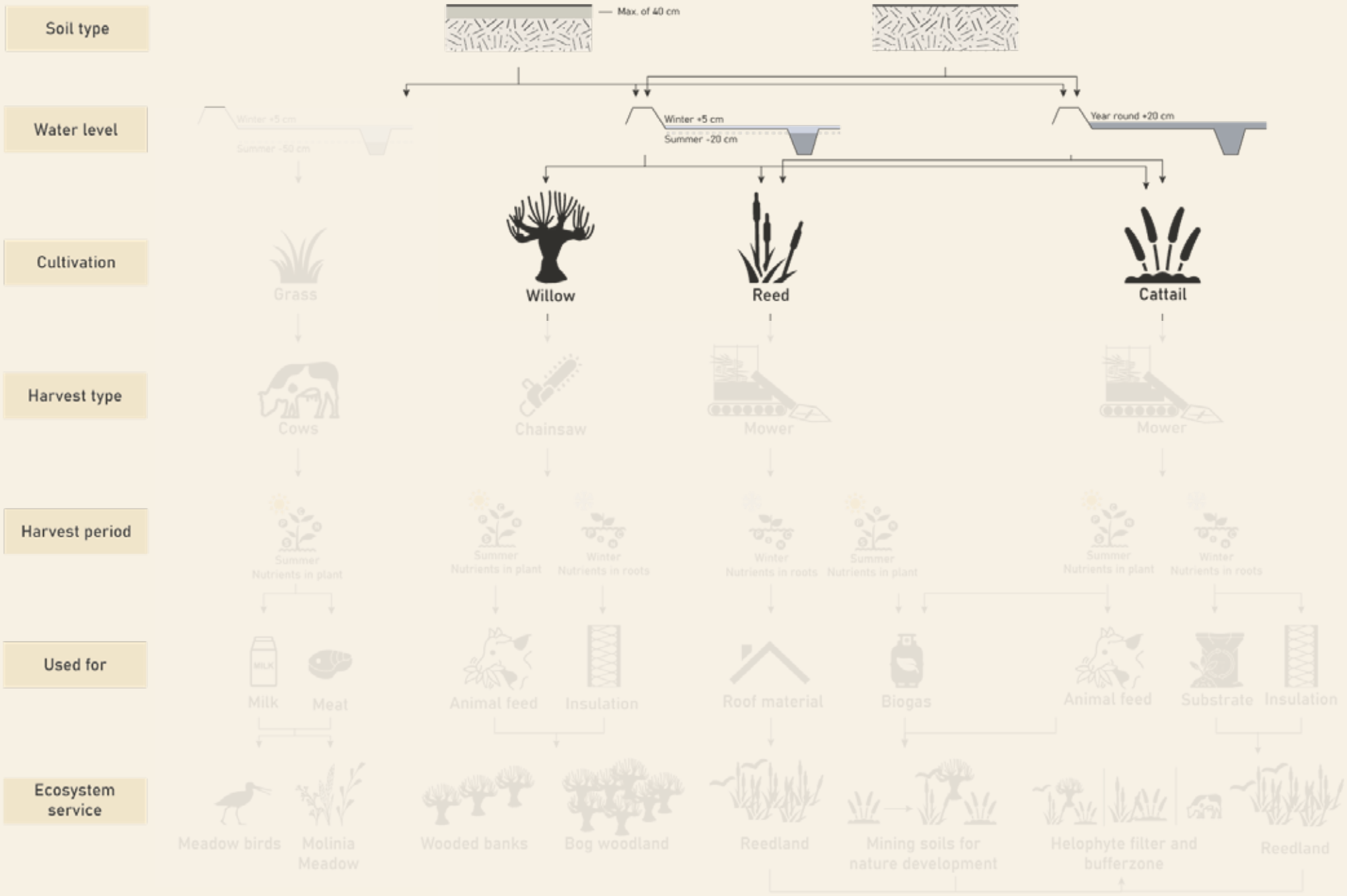





Figure 17. Relation agriculture practices to ecosystem and end use
Sources: made by author

# Characteristics agriculture practices

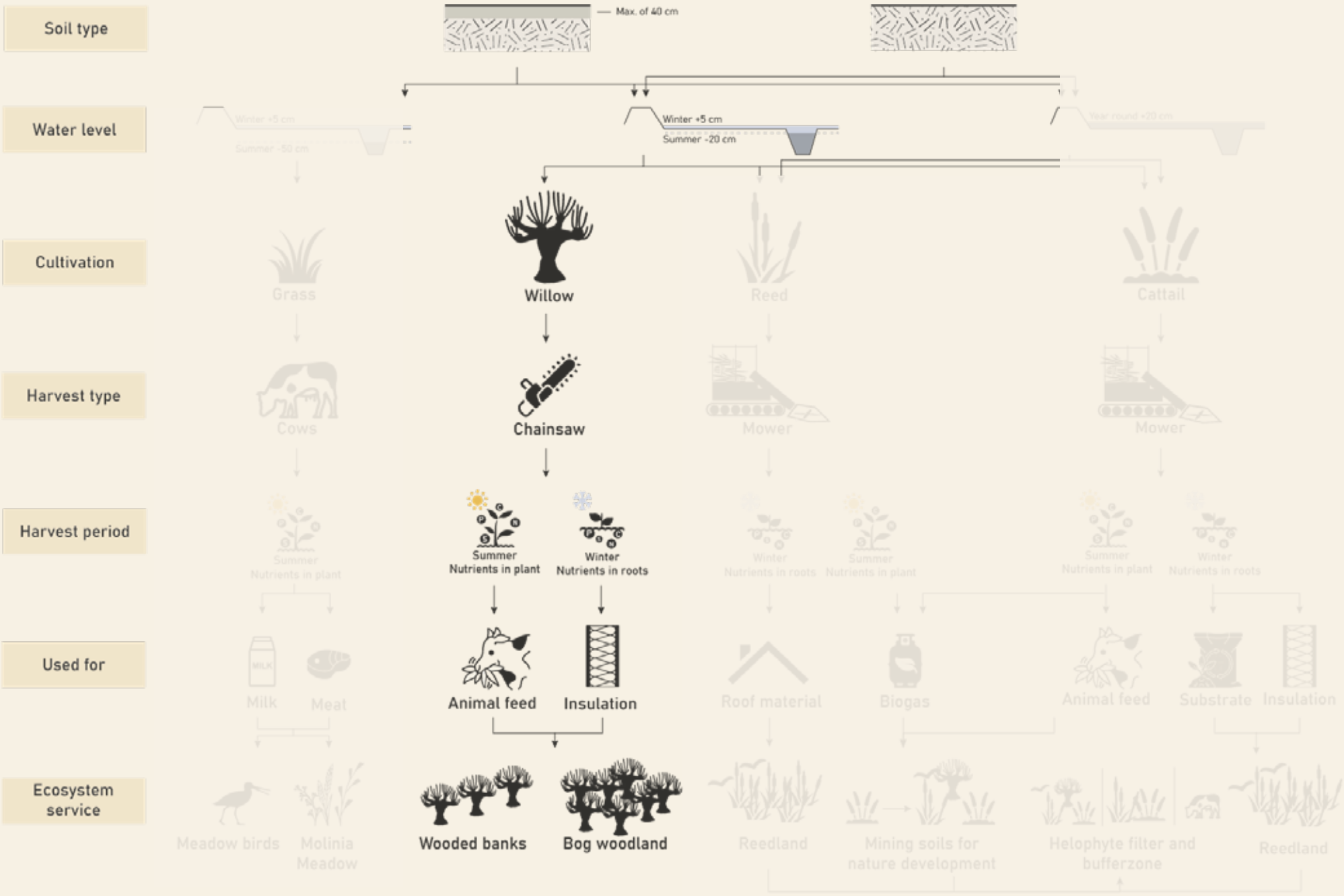





Figure 17. Relation agriculture practices to ecosystem and end use
Sources: made by author

# Characteristics agriculture practices

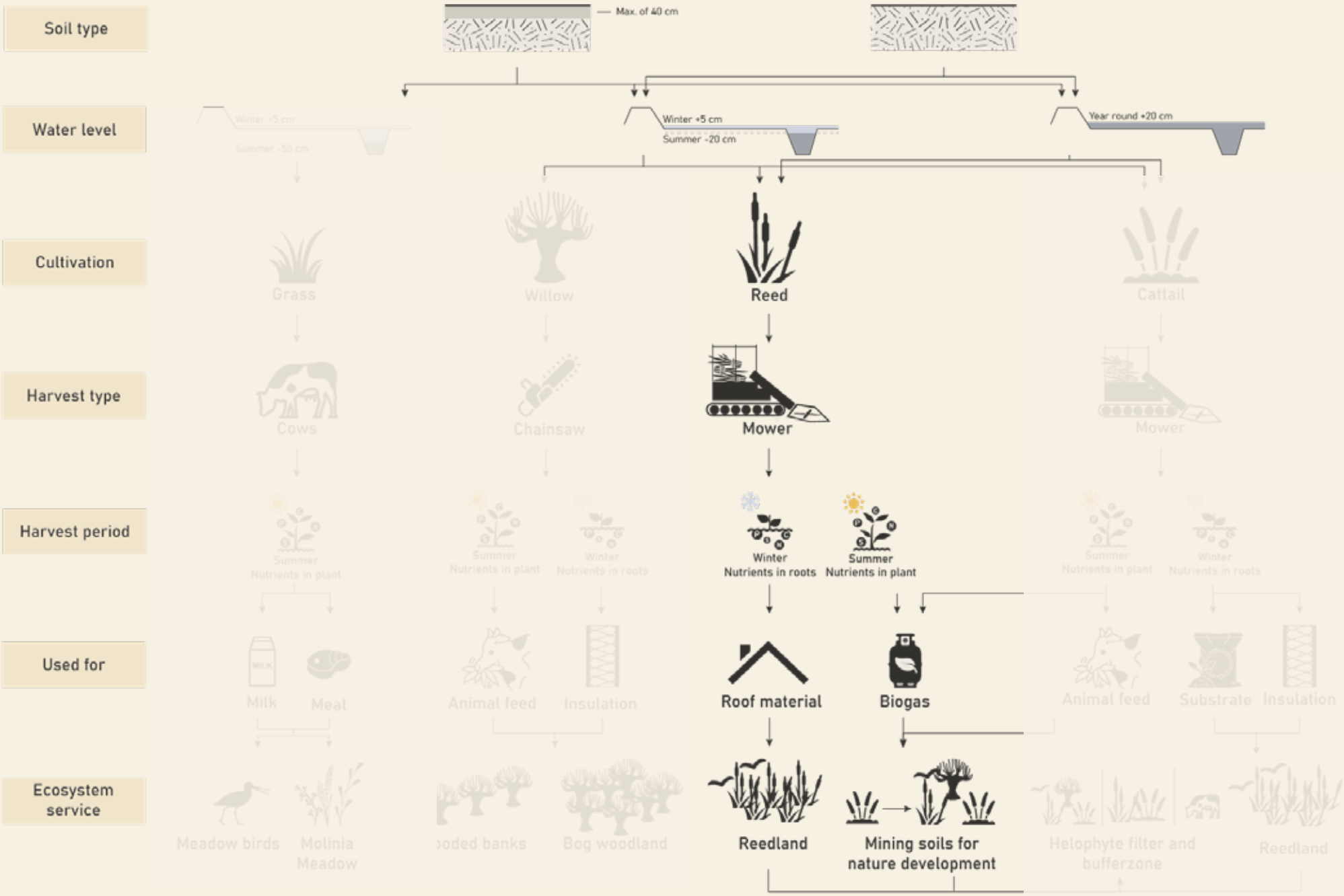





Figure 17. Relation agriculture practices to ecosystem and end use
Sources: made by author

# Characteristics agriculture practices

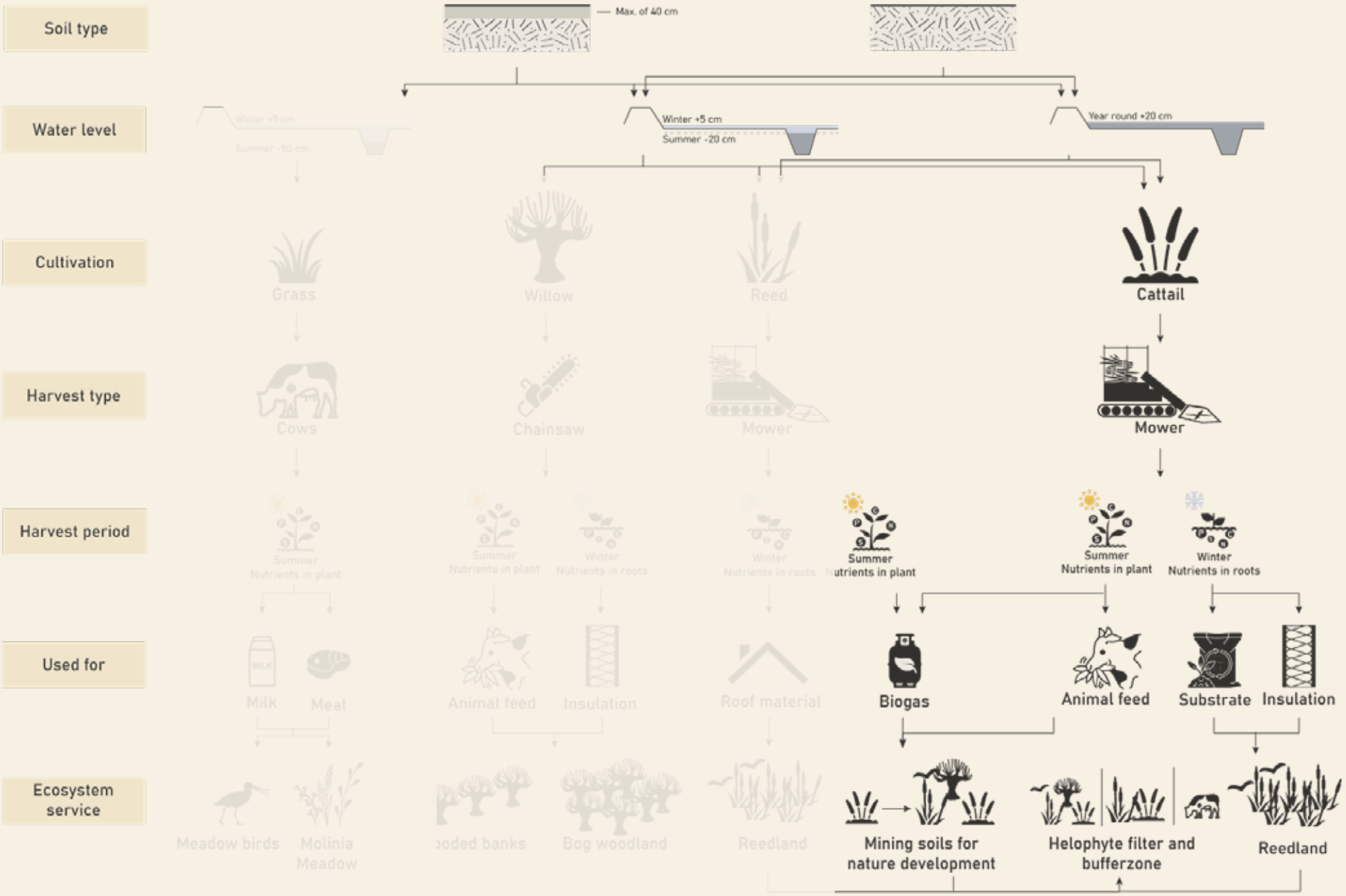





Figure 17. Relation agriculture practices to ecosystem and end use
Sources: made by author

# 4. Connection agriculture practices to circular system

Circular system

Spatial qualities

# Current agricultural system

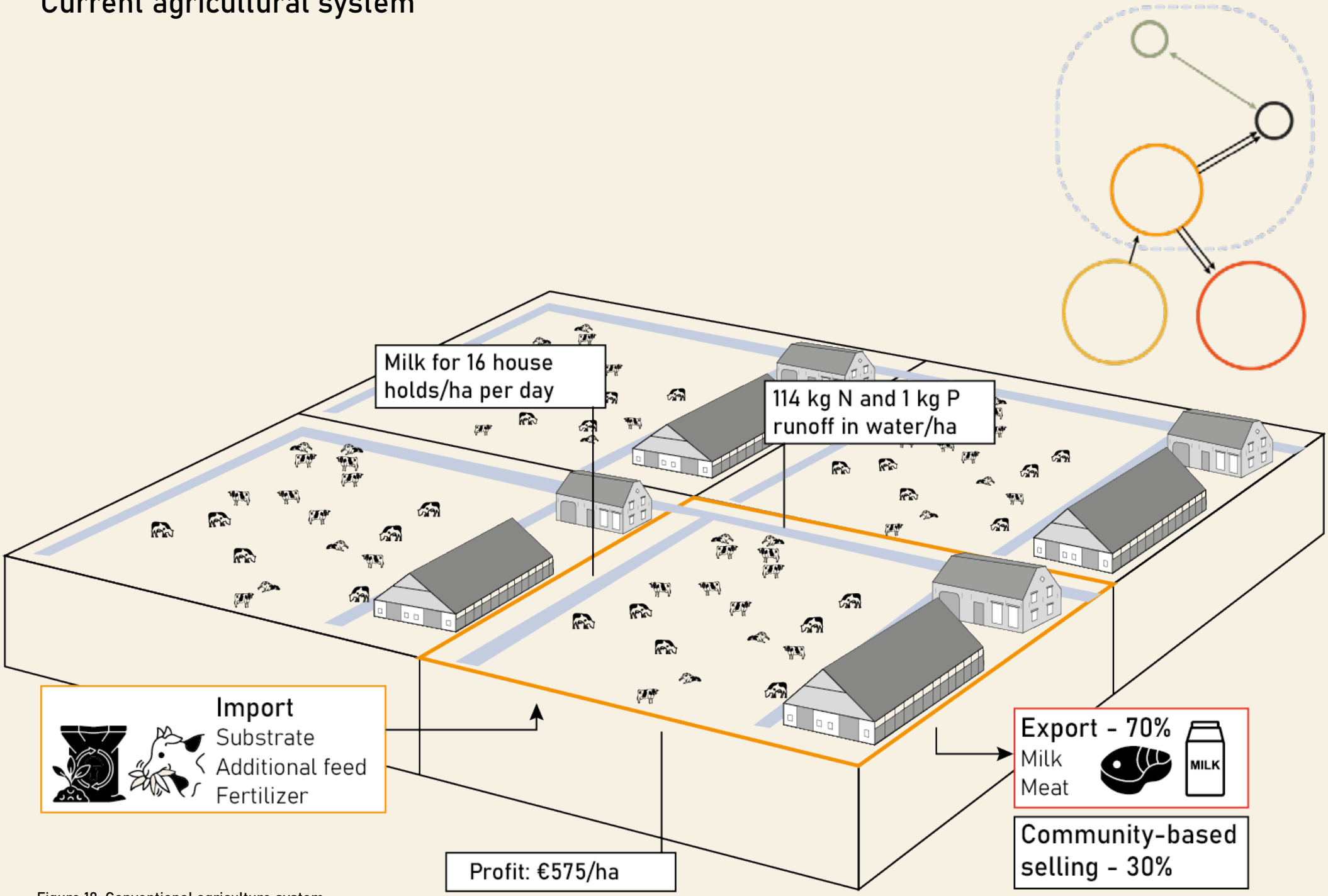



Figure 18. Conventional agriculture system
Sources: made by author

# Circularity of cattail cultivation

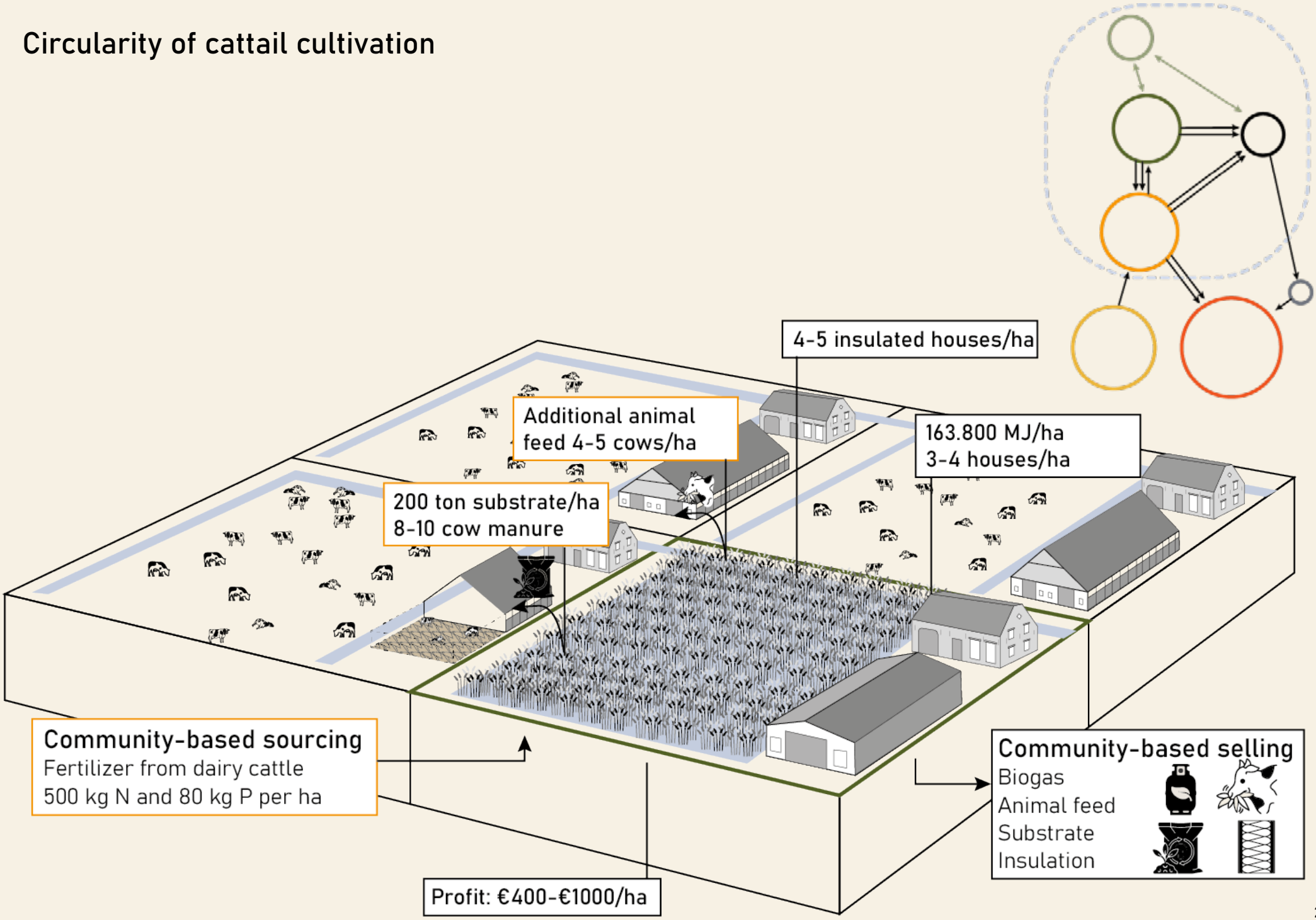



Figure 19. Position cattail agriculture in circular system
Sources: made by author

# Circularity of reed cultivation

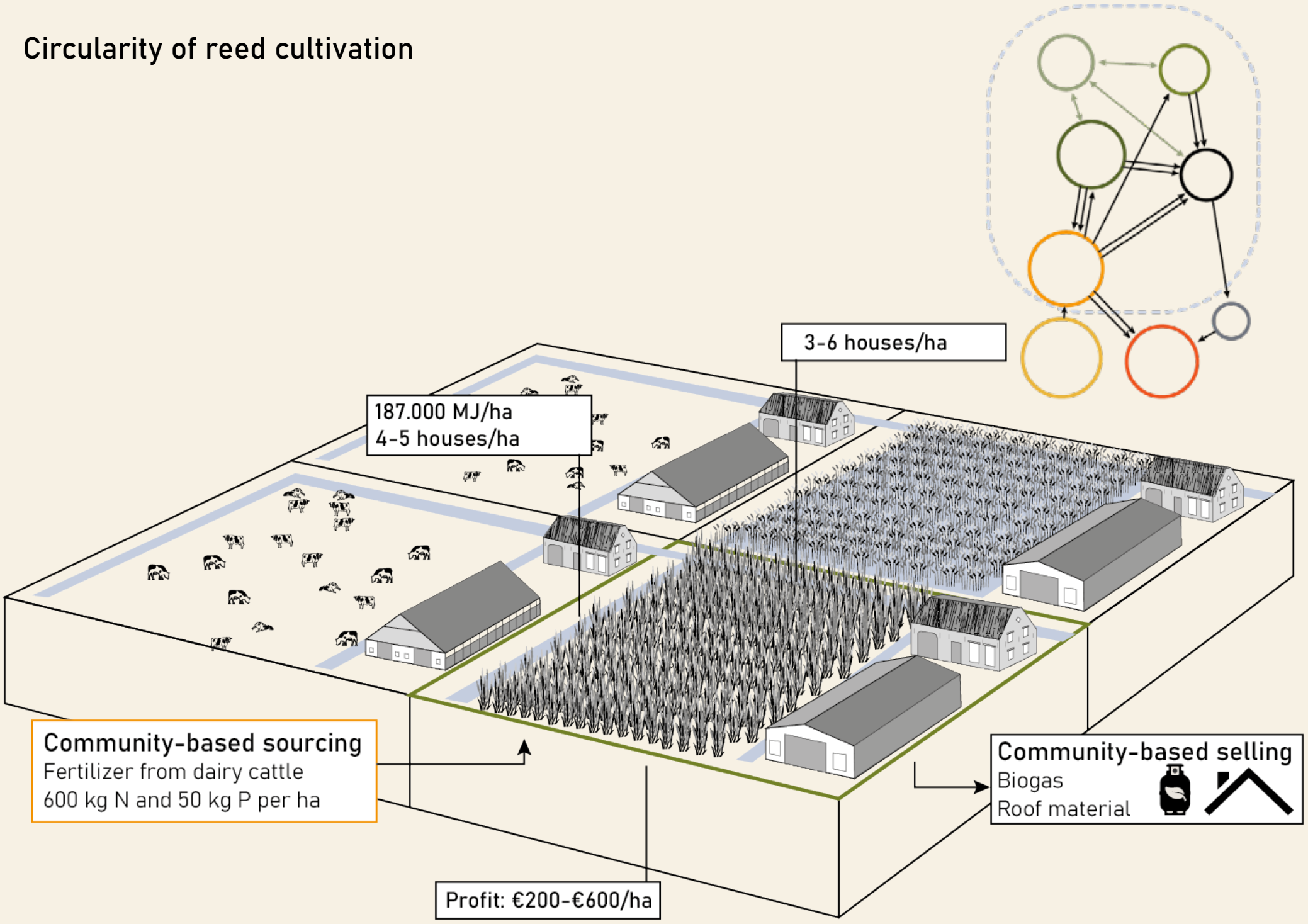





Figure 20. Position reed agriculture in circular system
Sources: made by author

# Circularity of willow cultivation

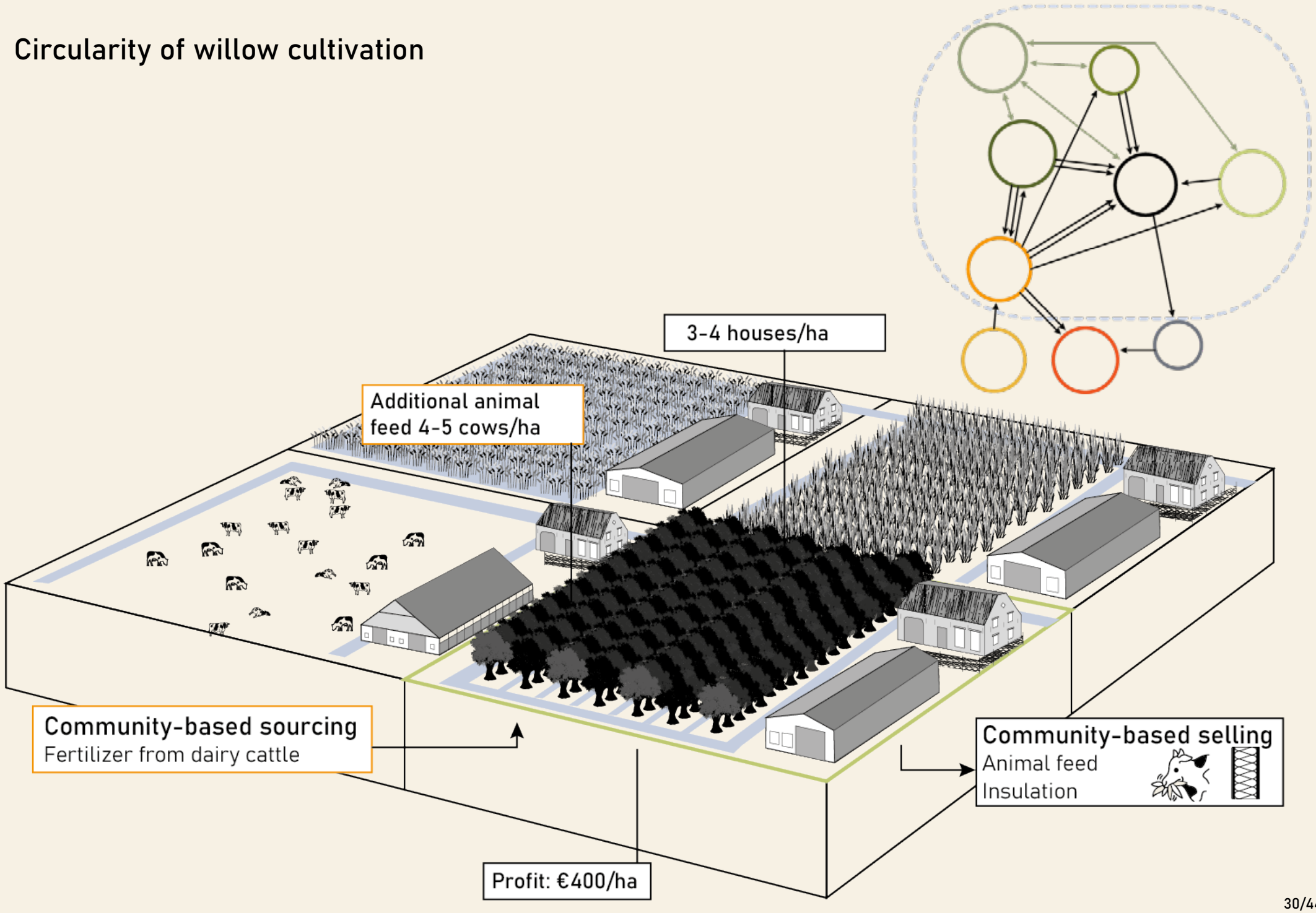





Figure 21. Position willow agriculture in circular system
Sources: made by author

# Circularity of dairy cattle

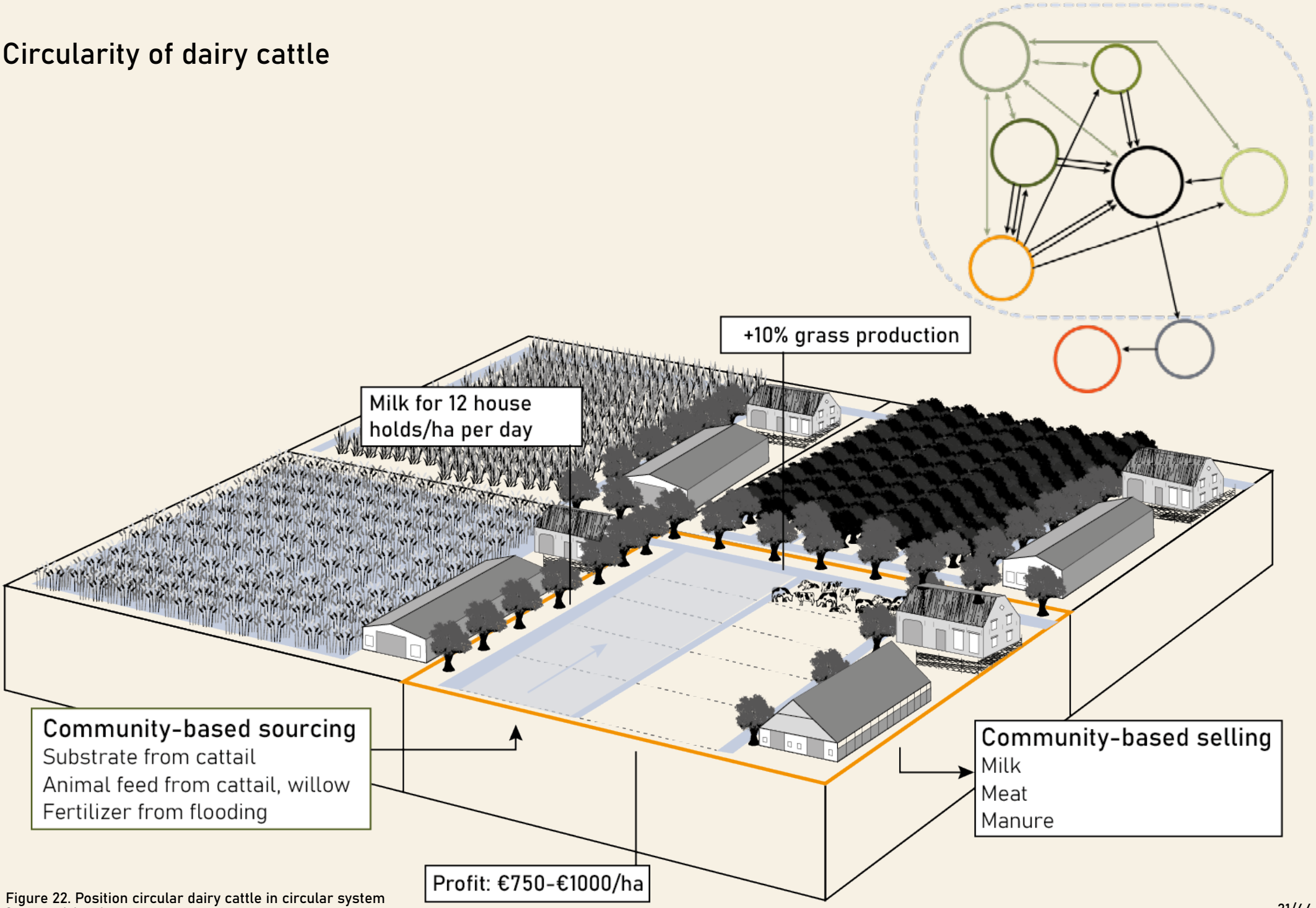



Figure 22. Position circular dairy cattle in circular system
Sources: made by author

# Before - Current system

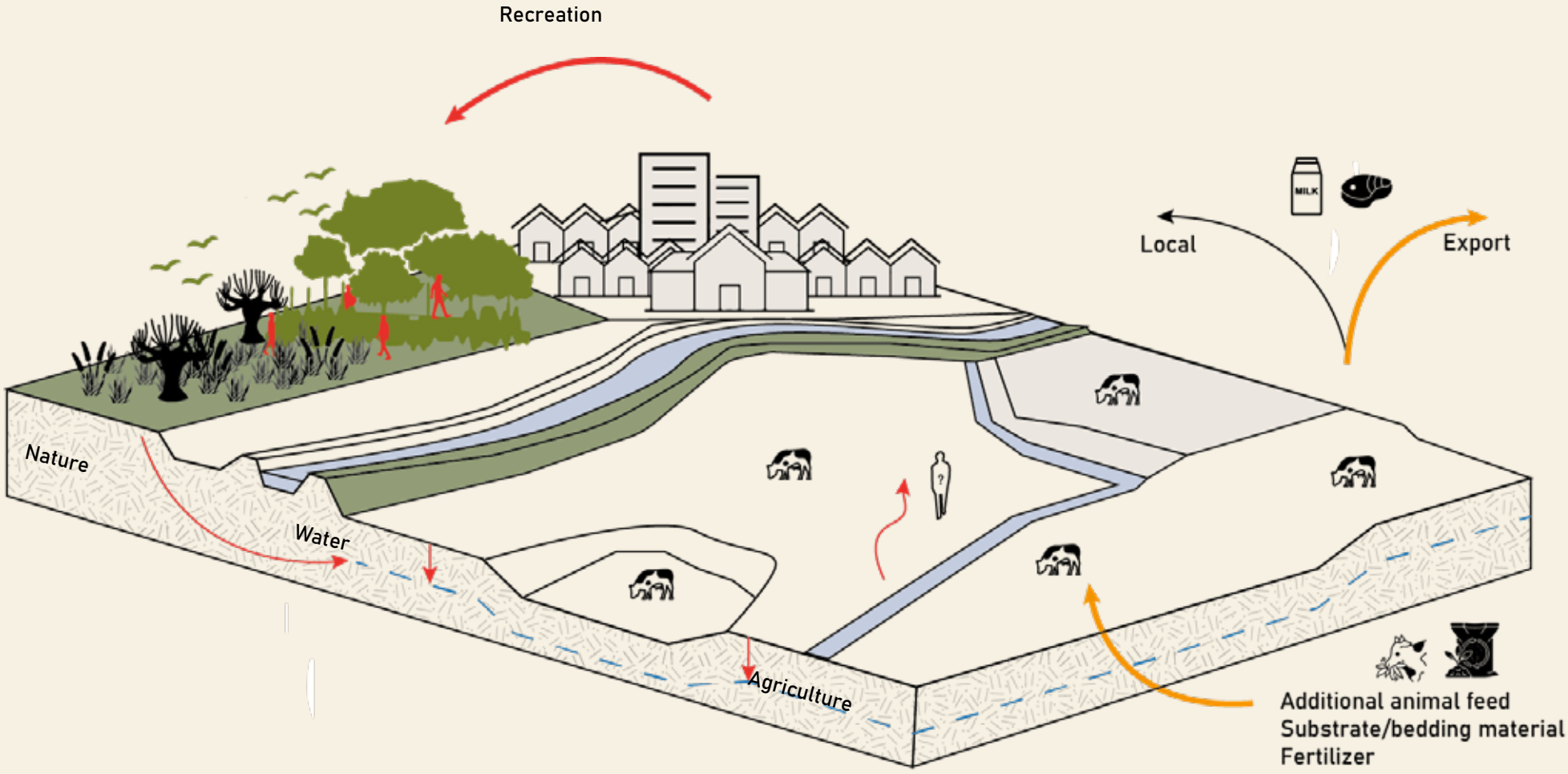



Figure 23. Current agricultural system
Sources: made by author

# After - Circular system

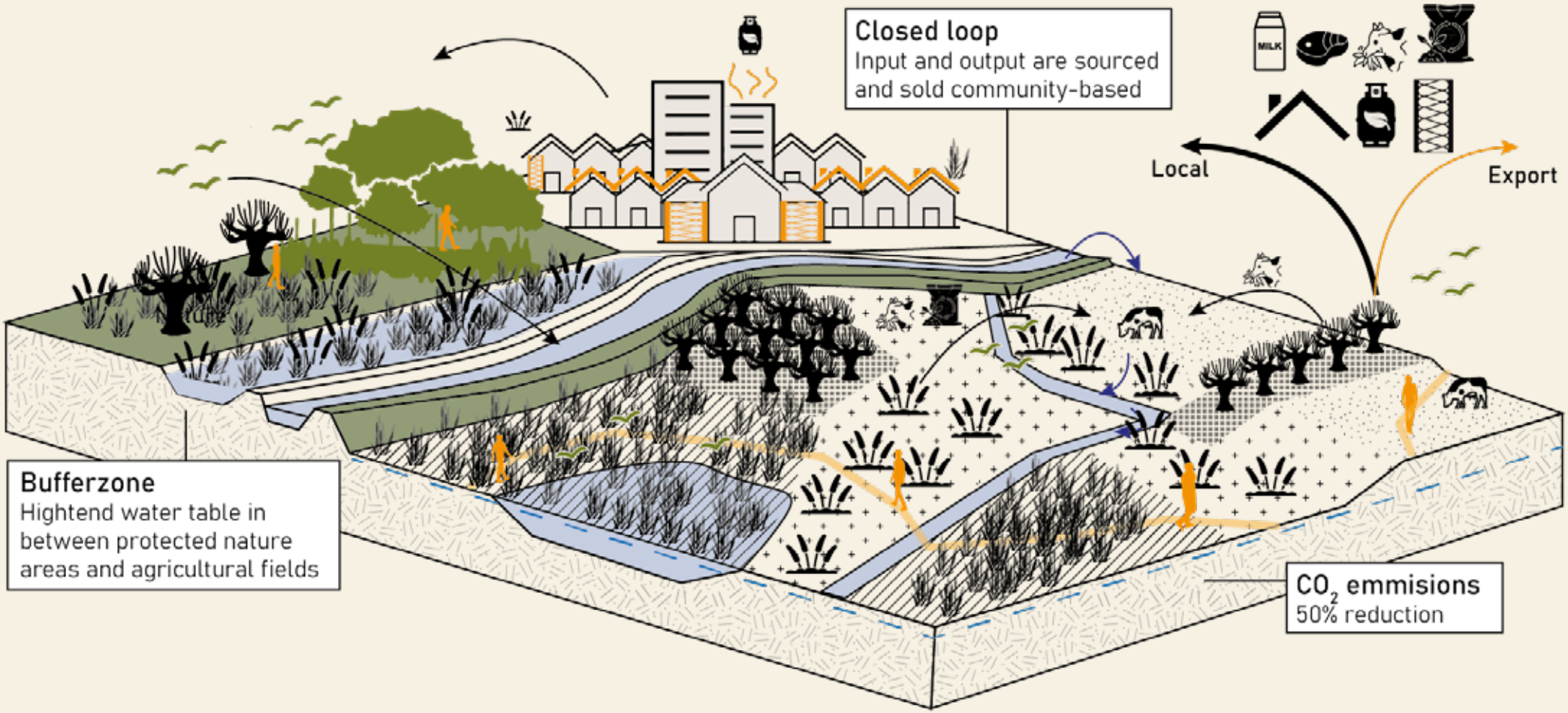



Figure 24. Impact circular agriculture on circular system
Sources: made by author

# 5. Implementation circular peat landscape

Water level approach
Spatial framework

# Water level approach in low midlands

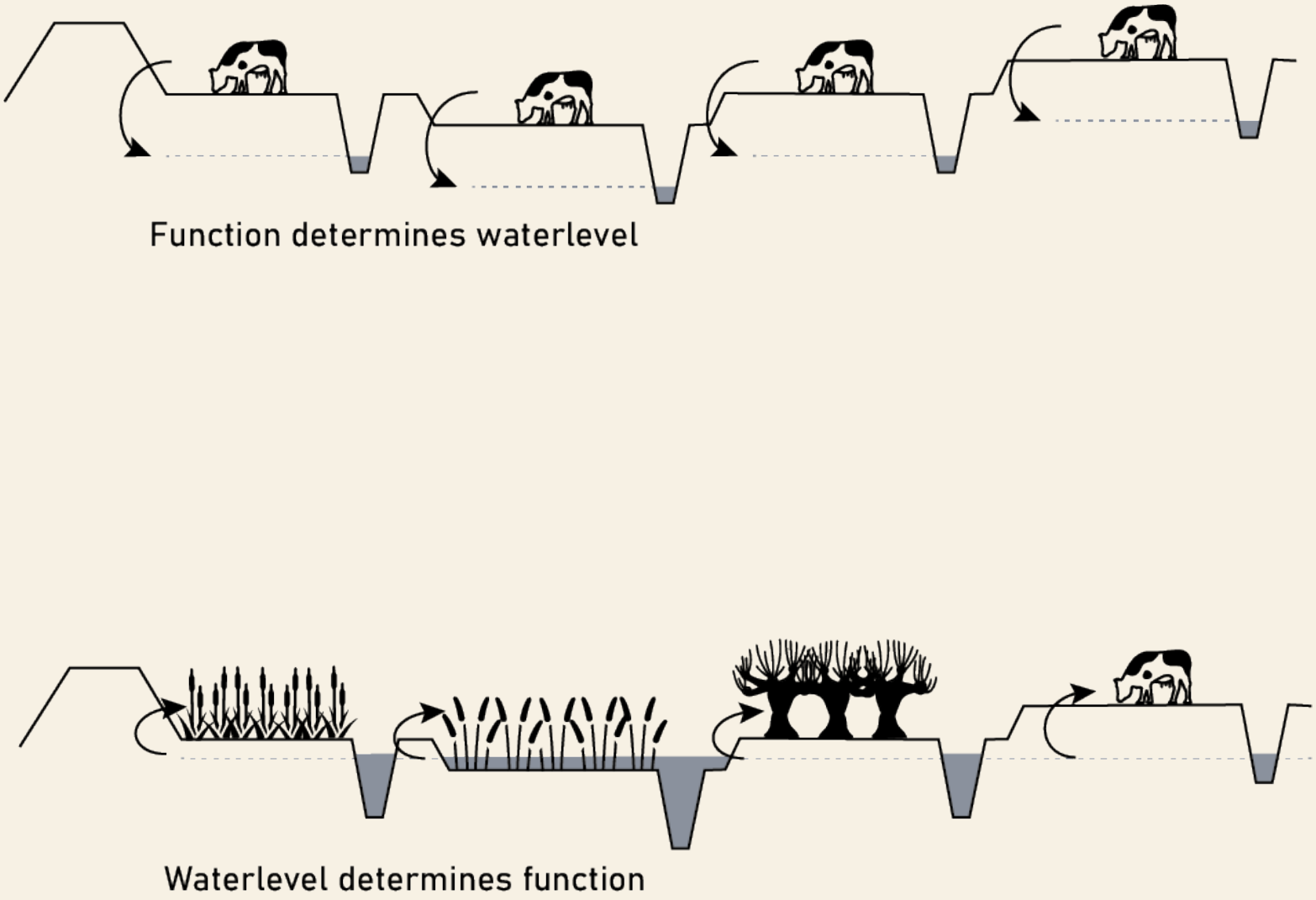





Figure 25. Water level approach for circular agriculture
Sources: made by author

# Waterlevel approach in low midlands

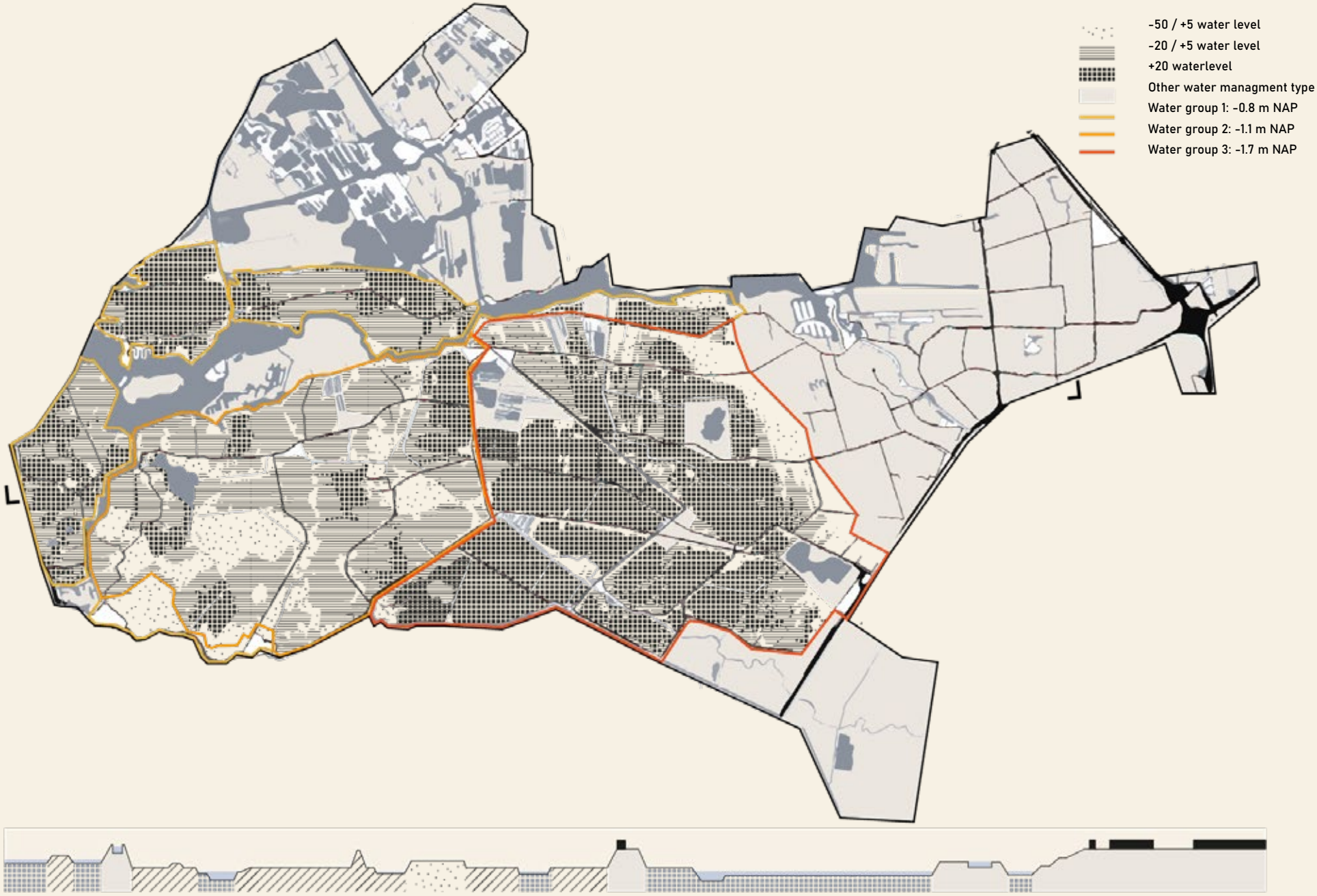
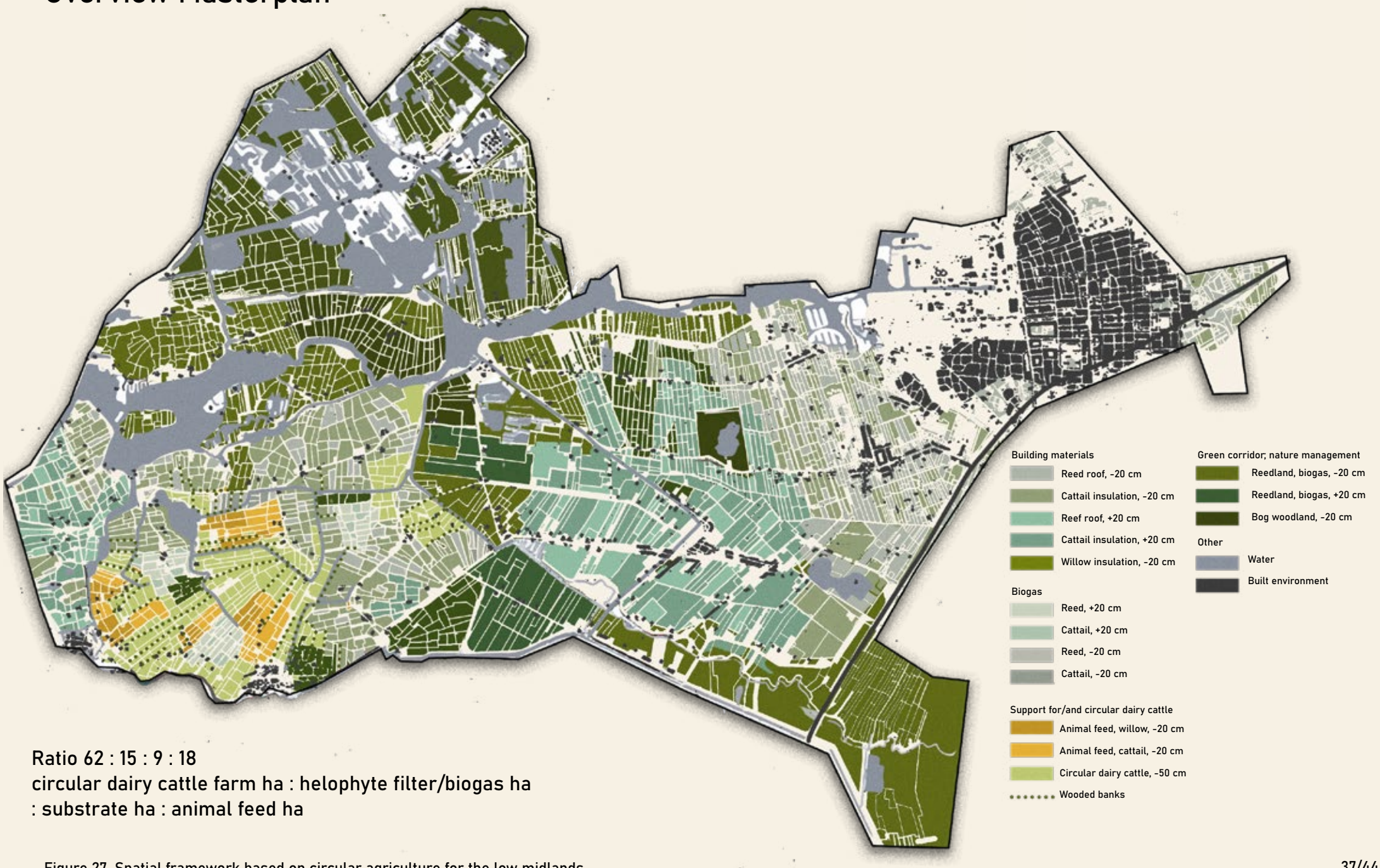



Figure 26. Water level groups in the low midlands
Sources: made by author

# Overview Masterplan




Ratio 62 : 15 : 9 : 18
circular dairy cattle farm ha : helophyte filter/biogas ha
: substrate ha : animal feed ha

Figure 27. Spatial framework based on circular agriculture for the low midlands
Source: made by author

# Zoom ins

Figure 28. Spatial framework based on circular agriculture for the low midlands
Source: made by author

# Active agricultural landscape



Figure 29. Visualization circular agricultural landscape
Sources: made by author

# Zoom in - green corridor


Figure 30. Inzoom on green corridor
Sources: made by author

# Recreational routing Green Corridor





Figure 31. Visualization green corridor
Sources: made by author

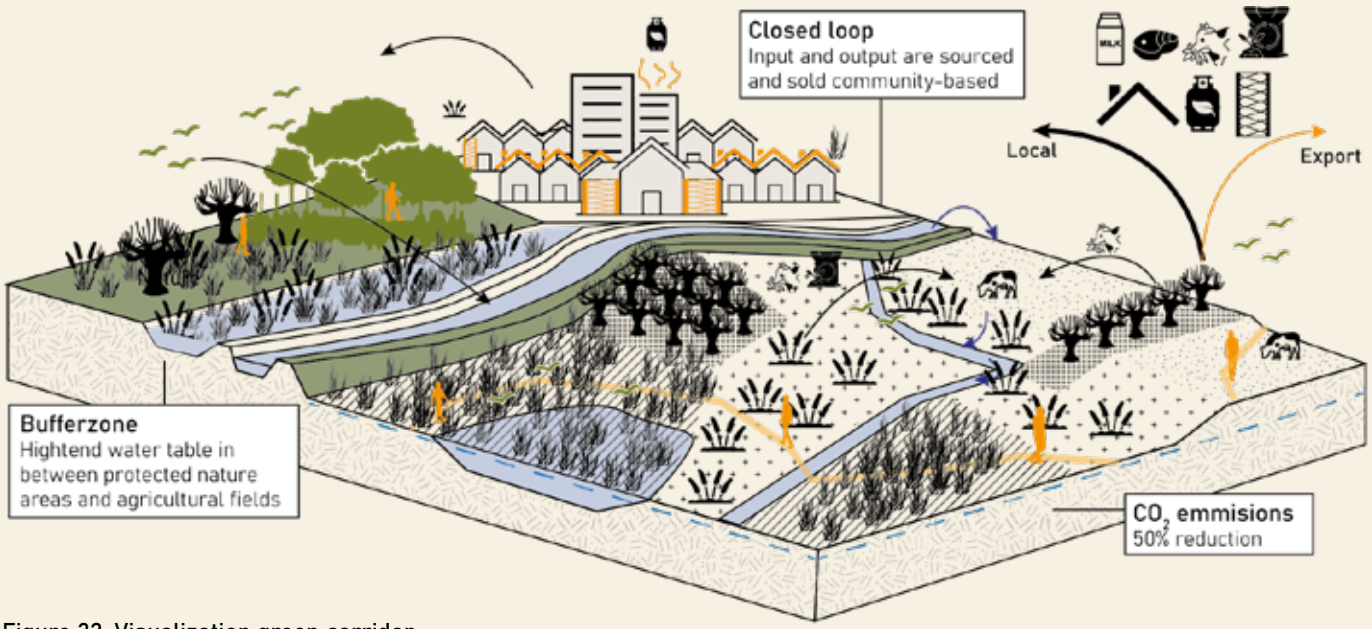
# 6. Conclusion

# Conclusion

**Research question**

What is the spatial framework based on circular agriculture to relieve peat oxidation in the 'low midlands' in Friesland, the Netherlands?

+ Healthy peat landscape
+ Circular economy
+ Long term sollution for agriculture productivity
+ Community cohesion



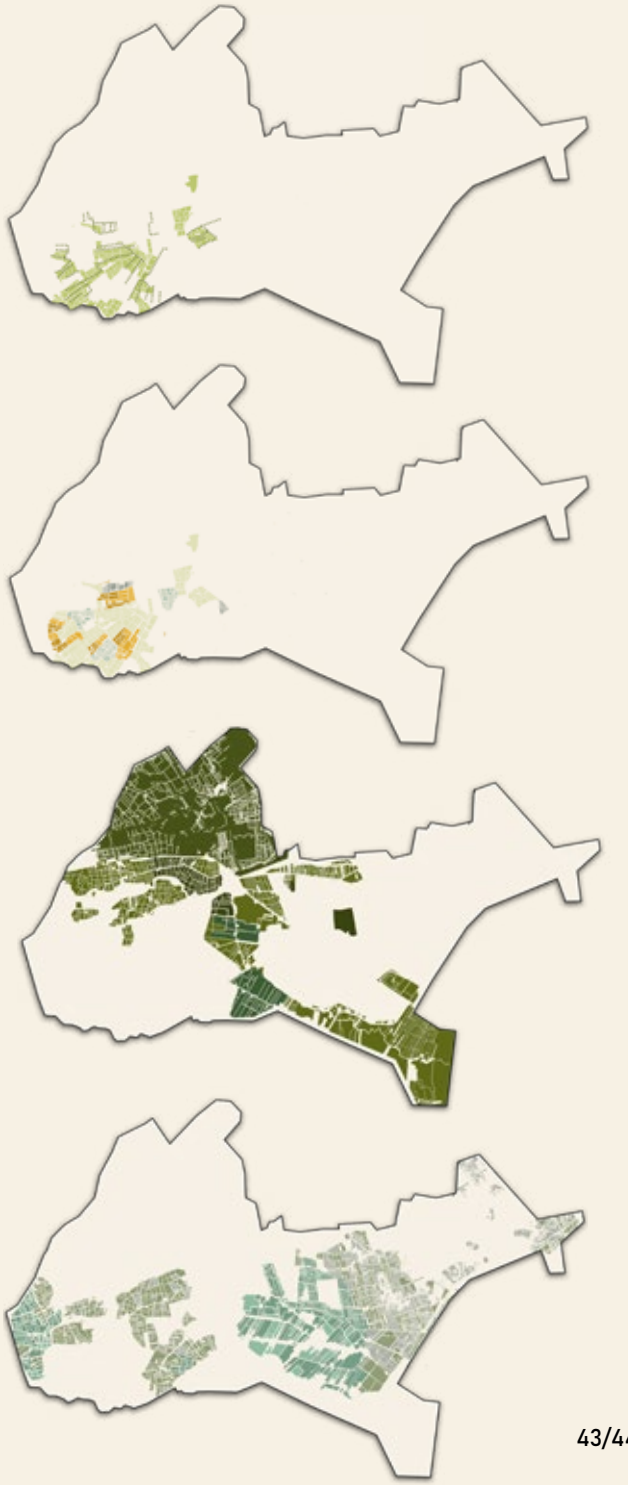



Figure 32. Visualization green corridor
Sources: made by author

# Thank you!