BORGEBY FÄLTDAGAR™

Reglerbar Dränering

CONTROLLED DRAINAGE IN OWN FARM COMPANY

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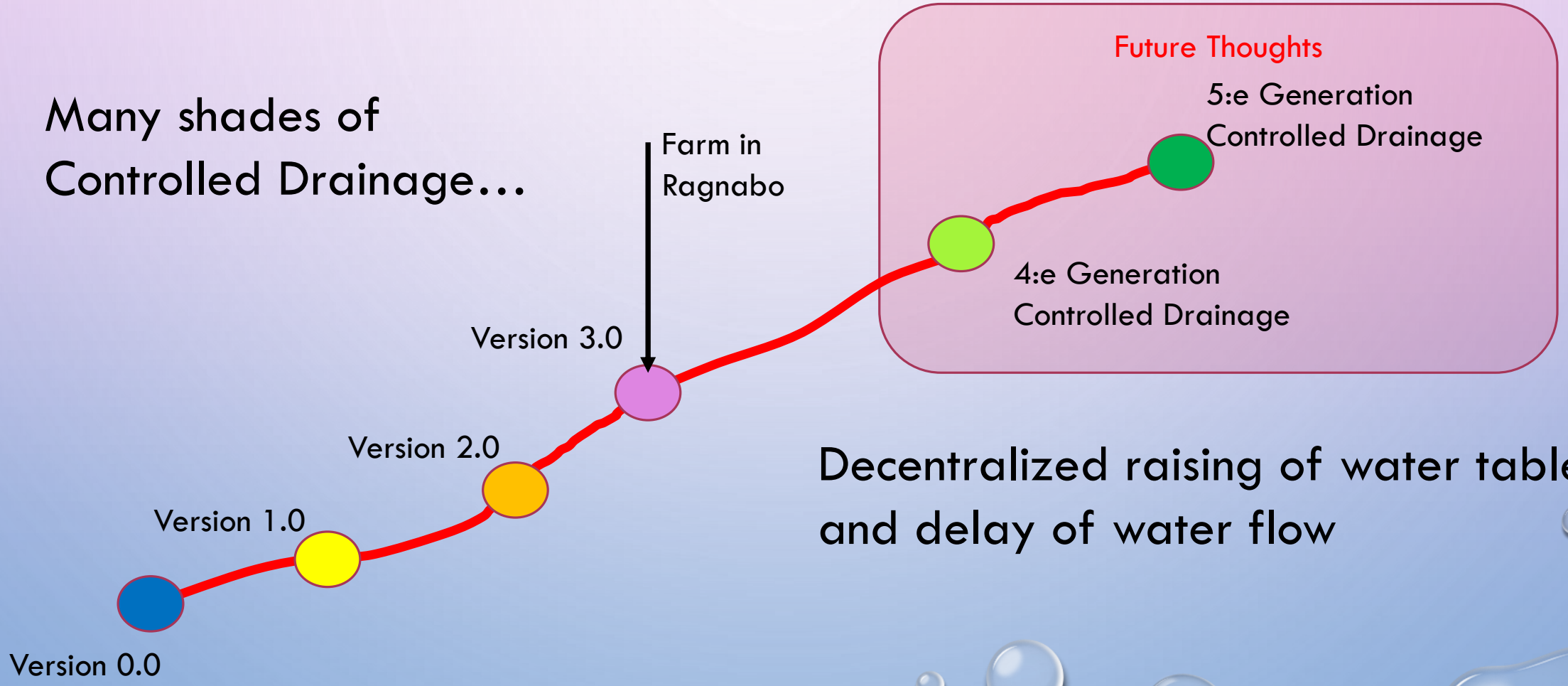
Farmer
Engineer

™HIR Skåne

THE RED THREAD …

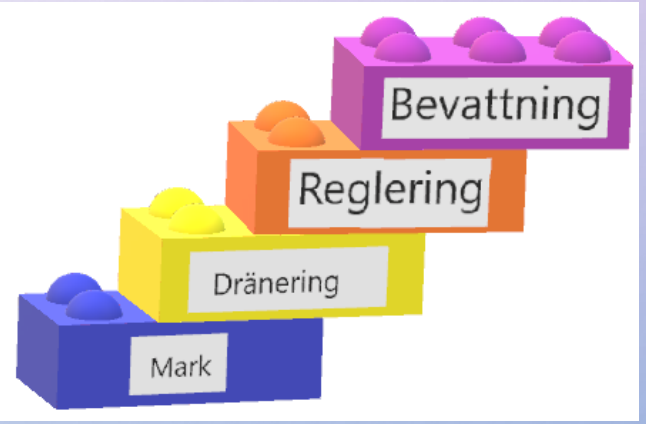
Many shades of Controlled Drainage…



Decentralized raising of water table and delay of water flow

DISPOSITION

- CLIMATE CHANGES REQUIRES ROBUST CULTIVATING SYSTEM
- PROPERTIES FOR CONTROLLED DRAINAGE
- REQUIREMENTS ON FARMLAND AND DRAINAGE
- ADD ON AS LEGO PARTS
- CULTIVATION VALUE/ENVIRONMENTAL VALUE/ECONOMY/MOVIE
- MY THOUGHTS FOR THE FUTURE



WHY IS IT CALLED CONTROLLED DRAINAGE?

- CHANGING BETWEEN TWO NEEDS REQUIRES CONTROLLABILITY
  - NEED TO GET RID OF SUPERFLUOUS OF WATER
  - NEED TO SAVE WATER FOR THE CROPS
- WATER MANAGEMENT IN THE HANDS OF THE FARMER

Farmer is in control

CHANGES - REQUIREMENTS - SOLUTIONS

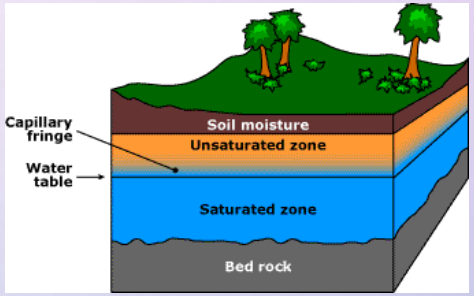
- CLIMATE CHANGES WITH WARMER CLIMATE
  - MORE WET WINTERS AND MORE DRY SUMMERS
- DEMANDS ON PRODUCTION
  - STRATEGY FOR INCREASED FOOD SUPPLY
- ENVIRONMENTAL DEMANDS
  - WE DO NOT WANT TO POLLUTE OUR WATER
- SOLUTIONS:
  - ROBUST CULTVATING SYSTEMS

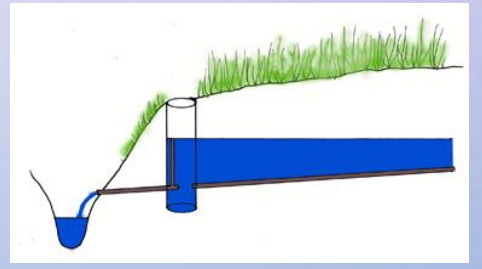
PROPERTIES OF CONTROLLED DRAINAGE

- WATER TABLE CONTROL TO ADJUST LEVEL
- DELAY OF WATER FLOW TO SEA
- HIGH ECONOMICS OF IRRIGATION
- EARLY AND FREEZE SECURED IRRIGATION
- HIGH CROP YIELD
- CLIMATE SMART CULTIVATION
- DECREASED NUTRIENTS LOSS
- REQUIRES SOME MAINTENANCE

Syre

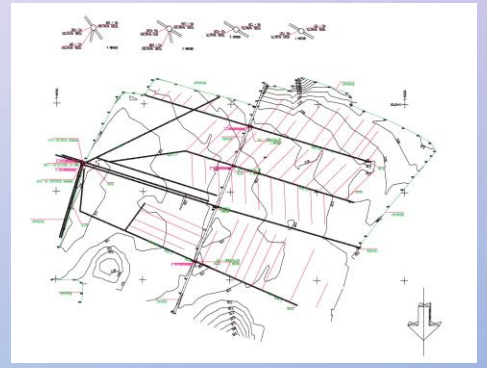
Vatten





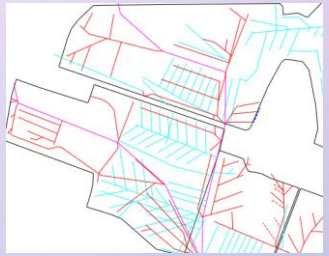
DEMANDS ON FARMLAND

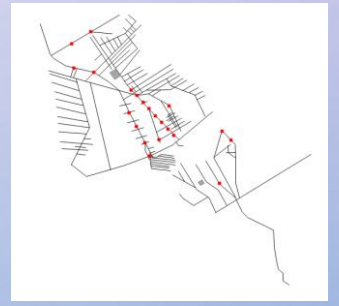
- LAND MUST HAVE A NEED FOR DRAINAGE
- LAND MUST BE FLAT, < 1.5 %
- LAND MUST HAVE CONDUCTIVITY FOR WATER
- LAND MUST HAVE "WATERPROOF" LAYER AT ABOUT 1 M DEPTH
- KNOWLEDGE OF TOPOGRAPHY OF THE LAND
- LAND MUST HAVE:
  - AN EXITING DRAINAGE INSTALLATION
  - OR A PLAN FOR A NEW/RE-CONDITIONED INSTALLATION



DEMANDS ON EXISTING DRAINAGE INSTALLATION

- INSTALLATION MUST BE IN GOOD CONDITION
- DOCUMENTATION AND MAPS MUST EXIST
- IF NOT DRONES CAN BE USED…
- KNOWLEDGE OF POSSIBLE OLDER DRAINAGE INSTALLATIONS
  - SPECIFICALLY CLOSE TO LOW POINTS IN FIELD

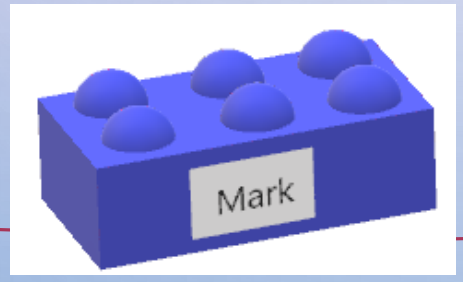




DRAINAGE 0.0 - PRINCIPLE OUTLINE

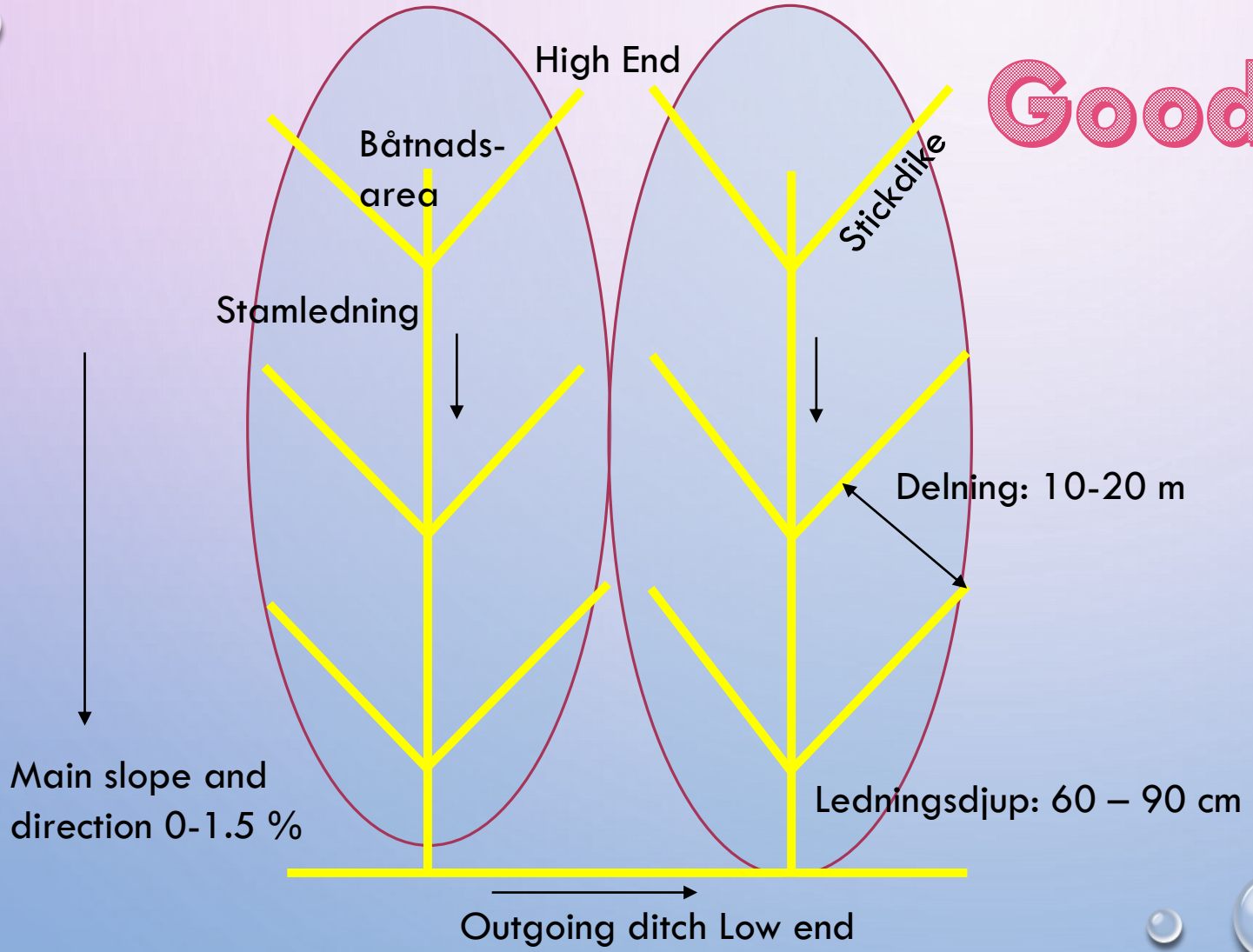
Hopeless Field

Eternal fallow field
Black marsch field



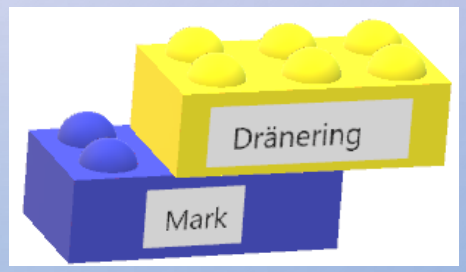
- NO DRAINAGE WHAT SO EVER
- NOT WORTH OF CULTIVATING
- GREAT NEED FOR DRAINAGE WORK
- CONSIDER NEW DRAINAGE OR WETLAND

DRAINAGE 1.0 - PRINCIPLE OUTLINE

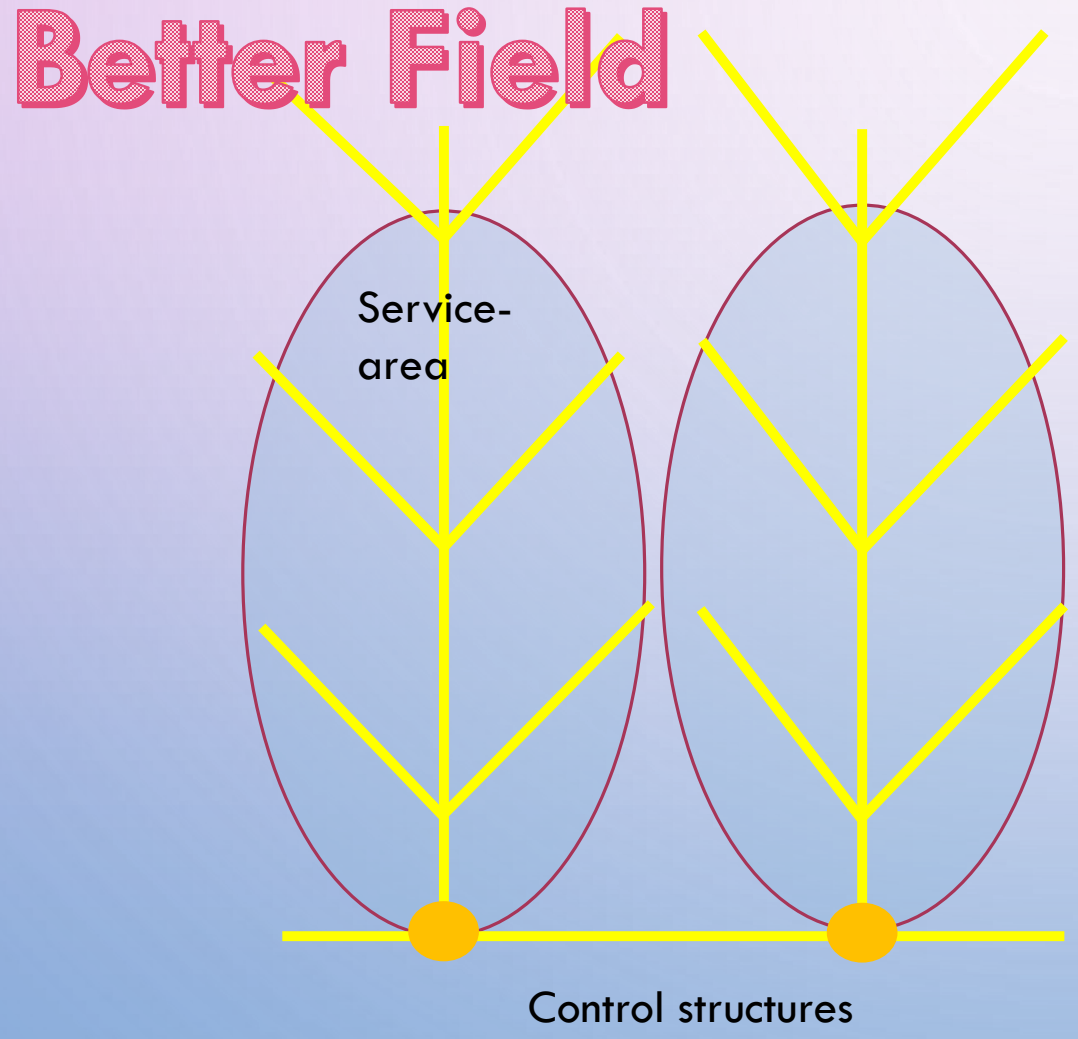


Good Field

- ADD-ON 0.0 –> 1.0
- GET RID OF SUPERFLUOUS OF WATER

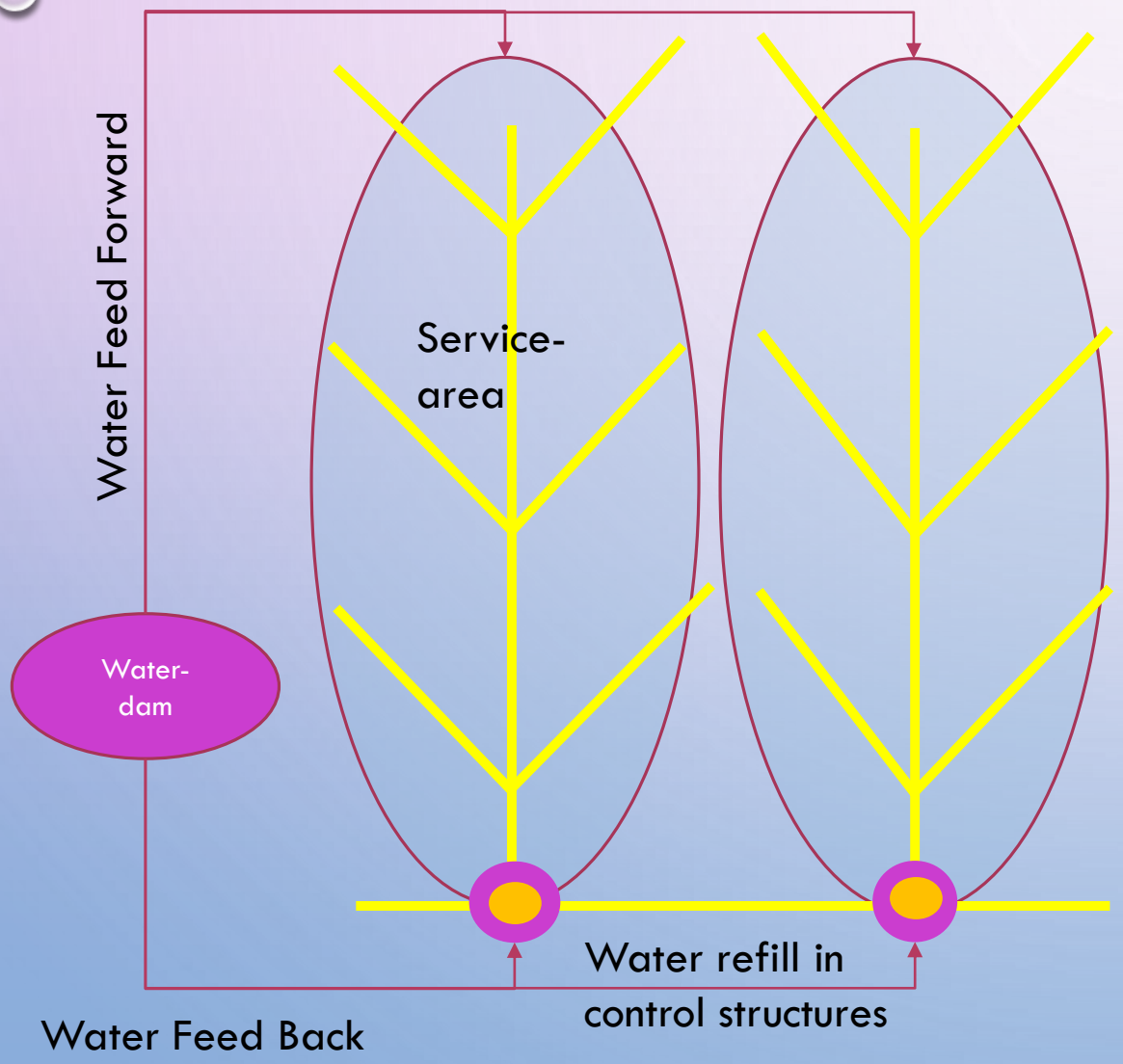


CONTROLLED DRAINAGE 2.0 – PRINCIPLE OUTLINE



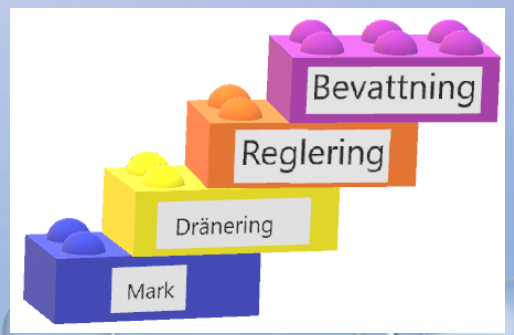
- CONTROLS WATER TABLE
- SAVES WATER TO CROP
- 2 CROPS ON SAME FIELD CAN HAVE DIFFERENT LEVELS
- SERVICE AREA ABOUT 1-1.5 HA/WELL
- FAST AND EARLY IRRIGATION START
  - WHOLE AREA FROM DAY 1
  - NO RISK OF FREEZING PUMP OR HYDRANTS

CONTROLLED DRAINAGE 3.0 – PRINCIPLE OUTLINE

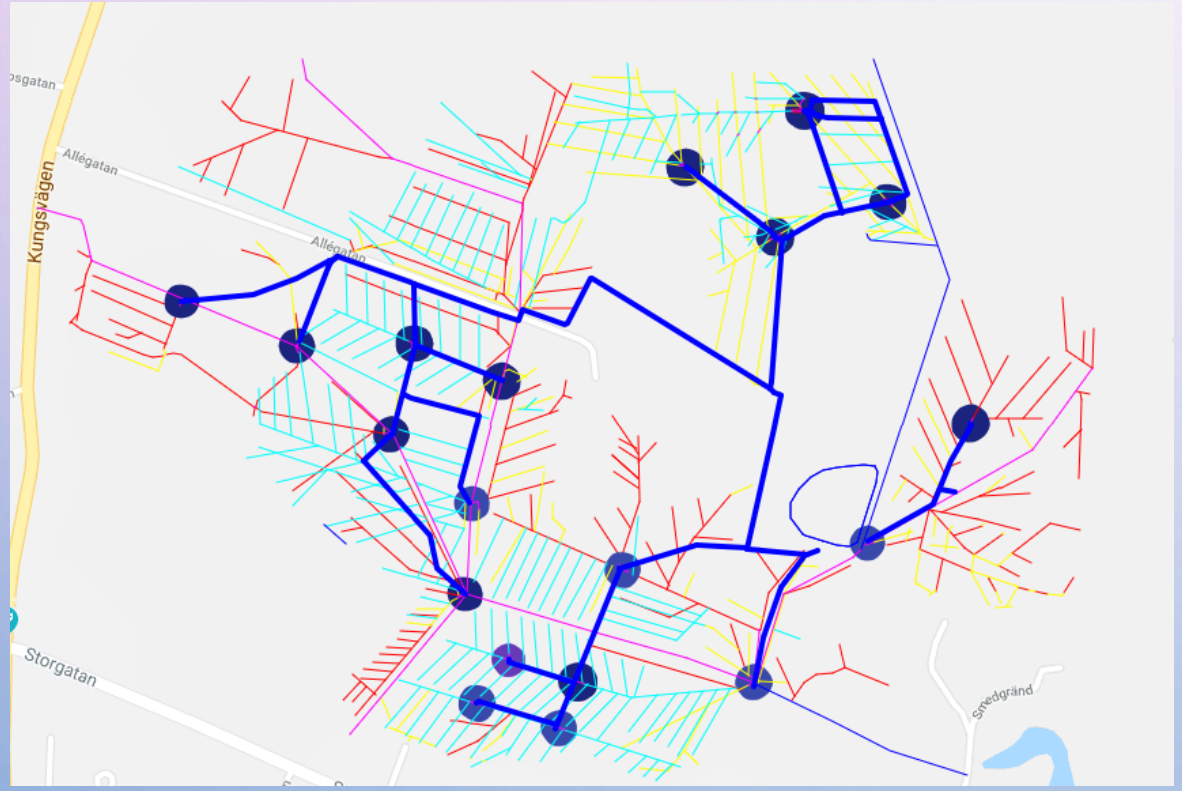


Best Field

- CONTROLS WATER TABLE WITH SUB-IRRIGATION
- ADD WATER UNDER DRY SEASON
- 2 CROPS CAN HAVE DIFFERENT IRRIGATION STRATEGIES
- NO DAMAGE TO CROP DUE TO MACHINE OPERATIONS



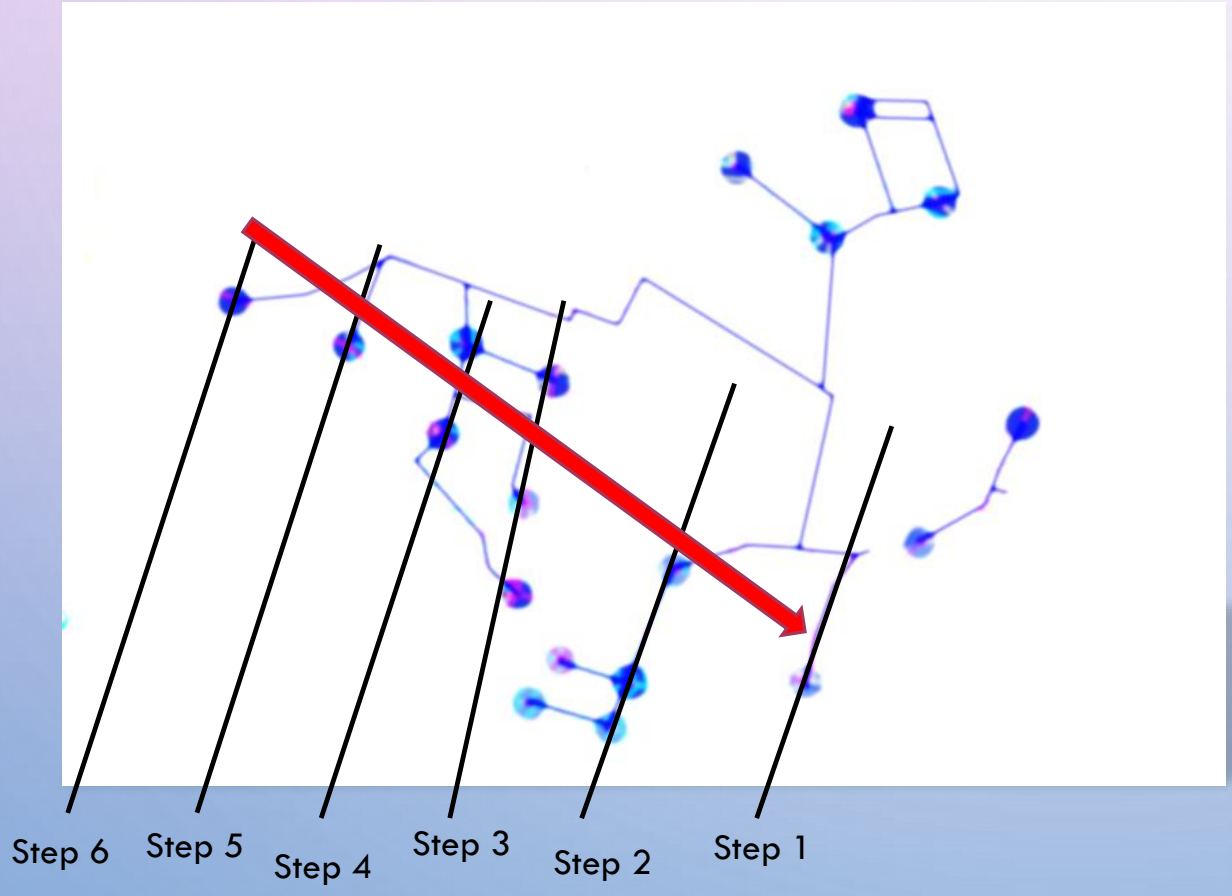
CONTROLLED DRAINAGE 3.0 IN OWN FARM COMPANY



To zoom and pan click here :
Google My Maps

Picture shows:
Drainage (—lightblue, —red, —yellow)
20 st. Control structures(● darkblue)
Waterline (— darkblue)

CONTROLLED DRAINAGE 6 STAIRS



Picture shows 6 controllable steps
Main slope about 0.7 %
Each step 80 cm
Raising height/step 50-60 cm
Effect of capillary about 10-20 cm

ADDED VALUE OF UPGRADING: 0.5 –> 3.0

0.5 DRAINAGE (HALF GOOD, HALF BAD)

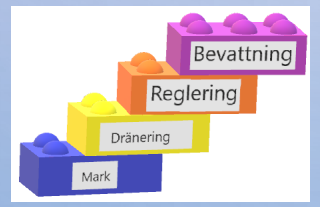
1.0 DRAINAGE (VERY GOOD)

2.0 CONTROLLED DRAINAGE

3.0 CONTROLLED DRAINAGE WITH SUB-IRRIGATION

Added value in cultivation

Less nutrient losses



Main Message

Higher crop yield
Less water run off
Fertilizer precision to "known yield"

CULTIVATION VALUE/NUTRIENTS LOSSES

BEFORE/AFTER CONTROLLED DRAINAGE WITH IRRIGATION

- INCREASED CULTIVATION VALUE +3348 KR/HA
- INCREASED CROP YIELD +31%
- DECREASED N-SURPLUS - 41 KG N/HA*
- DECREASED N-LOSSES -12 KG N/HA*

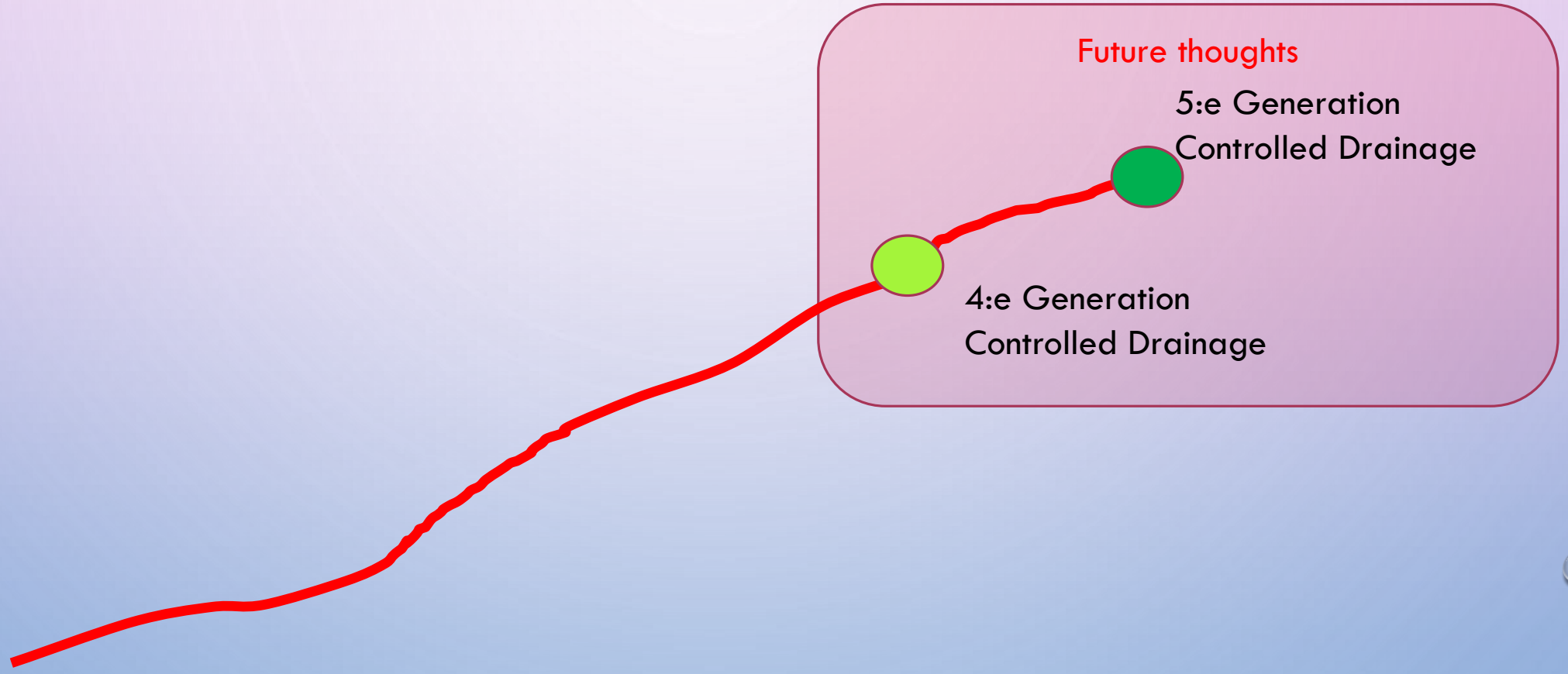
* Greppa Näringens växtodlingsbalans 2012

RAISING WATER OUTLET OCH IRRIGATION 2019

- LOGG BOOK
  - 7 APRIL: RAISING STARTED (WINTER WHEAT)
  - 27 APRIL: SUB IRRIGATION STARTED (WINTER WHEAT)
  - 3 MAJ: MOVIE ”DAMNING & IRRIGATION ON 1 MIN”
  - 27 JUNI: PLANNED START SUB IRRIGATION OF POTATOES

Sub irrigation in planned potatoes field 2019

FUTURE ?


Future thoughts
5:e Generation
Controlled Drainage
4:e Generation
Controlled Drainage

FOURTH GENERATION CONTROLLED DRAINAGE 4G

- ELECTRIC EQUIPMENT AND AUTOMATIC OPERATION OF CONTROL STRUCTURES
- SCALED UP TO LARGE FIELDS
- NO OBSTACLES FOR AGRICULTURE MACHINE OPERATION

FIFTH GENERATION CONTROLLED DRAINAGE 5G

- NEW CLOUD SERVICE
  - REGIONAL DATA COLLECTION FROM INSTALLATIONS OF CONTROLLED DRAINAGE, WATER FLOWS, RAINFALL ETC.
  - SHOWS WATER TABLE LEVELS AND WATERFLOWS AT FARM LEVEL
  - GIVES RECOMMENDATIONS FOR PRECISIONS IRRIGATION WITH CONTROLLED DRAINAGE OR OTHER EQUIPMENT
  - FORECAST SERVICE

CHALLENGES

- FOR FARMERS
  - MAINTENANCE AND REALIZATION OF CONTROLLED DRAINAGE
- EXCAVATING ENTREPRENEURS
  - TO HAVE CAPACITY FOR 10000 HA PER YEAR
- FOR TECHNIQUE INNOVATORS
  - DEVELOPMENT OF FUTURE CONTROL STRUCTURES
- FOR RESEARCHERS AND SCIENTISTS
  - DEVELOP MATHEMATICAL MODELS FOR WATER TRANSPORT
  - LOCAL FORECAST SERVICES AT FARM LEVEL

JUST TO WRAP UP …

Investments in farmland constructions are driven by climate change and food supply strategy

Hopeless Field

Intelligent watersystem

THANK YOU FOR YOUR ATTENTION

- QUESTIONS?

Link to presentation and other course material
http://www.ragnabodata.se/course_material/index.html