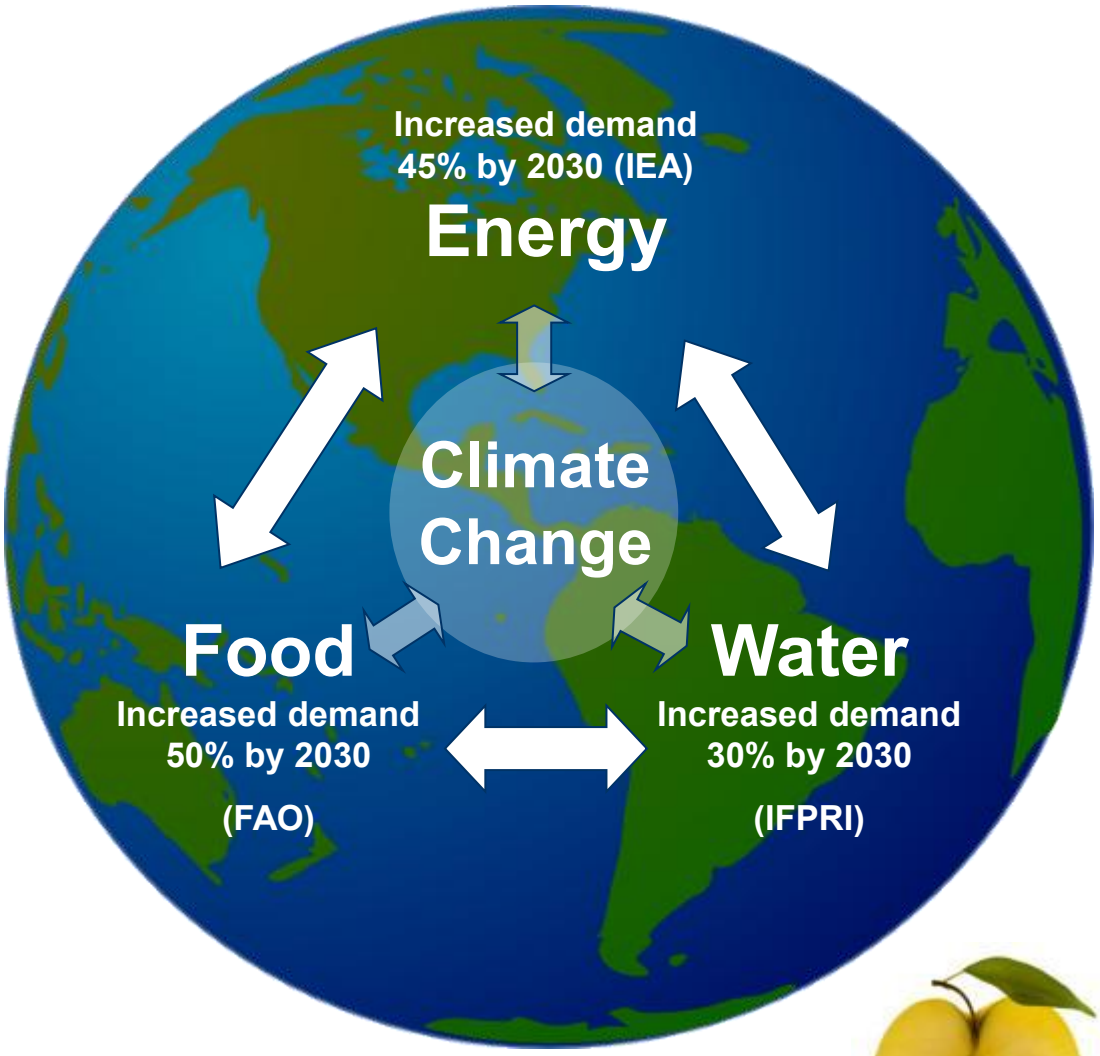
Stargrazing: technology and its potential impact on water in agriculture

Wet Network

March 2013

Perfect Storm

1. Increasing population
2. Changing diets
3. Losing land to urbanisation and rising sea levels



Prof Sir John Beddington, UK Government's Chief Scientist

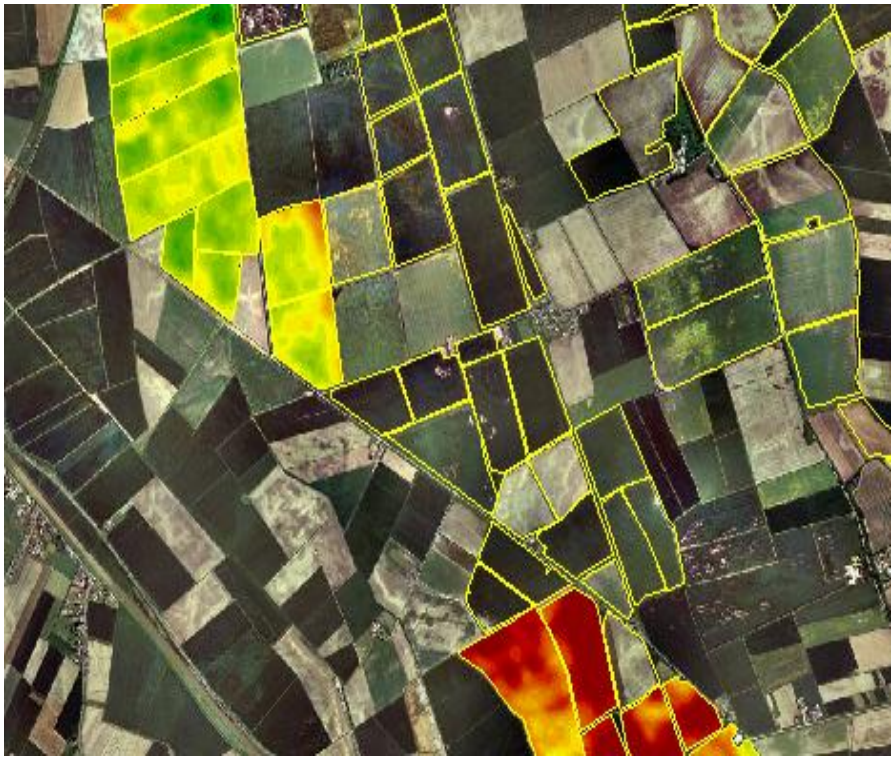
Sustainable intensification

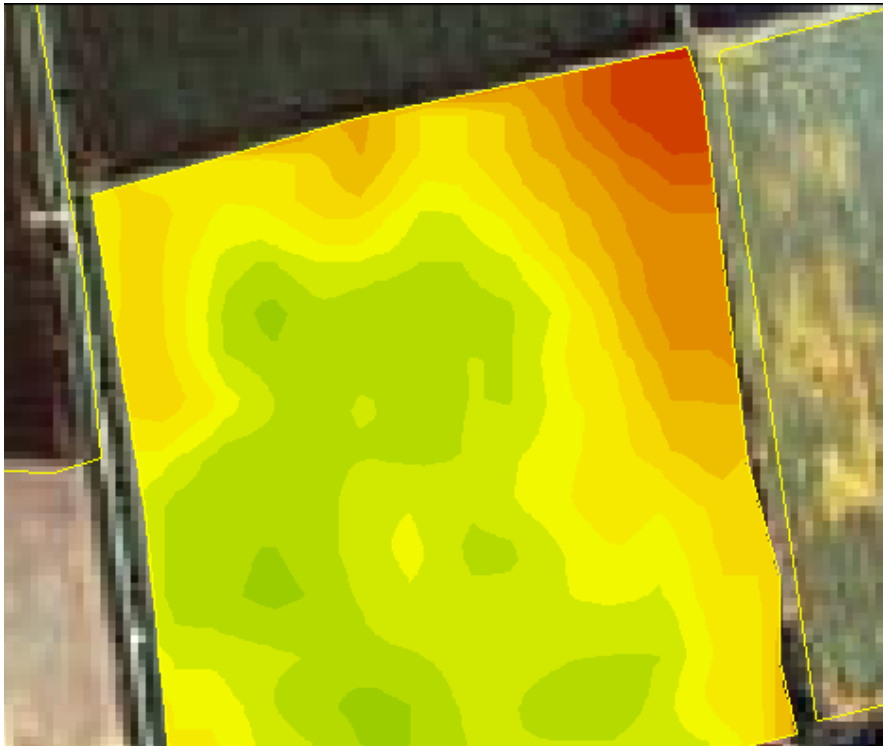
- Reduce inputs (agrochemicals, fertiliser)
- Reduce water and energy use
- Increase crop yields
- Increase resilience to climate variations
- Increase understanding and actions for wildlife

Current best practice

- Auto-steer and position guidance
- Use of N sensors
- Improving understanding of soils
  - Compaction reduction
  - Zoning

Satellite imagery: OSR leaf cover



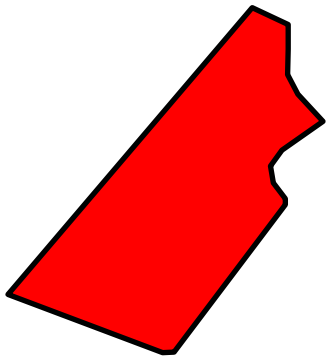


Management units reduction of scale

- Conventional or Traditional Farming

  Field

  One rate

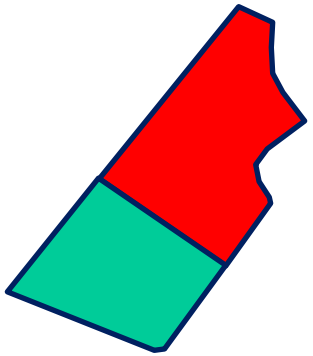


- Precision Farming

  Sub-Field

  Variable dose rate

  Patch application



- Single-Plant-Care or Plant Level Husbandry

  Single Plant

  Individual dose rate

Autonomous crop scouting

- Low power, non contact assessment of crop
  - Nutrient stress (multispectral camera)
  - Diseases (visible camera, biosensors)
  - Crop height/growth (ultrasonic rangefinder)
  - Weeds (visible camera)

Water management

- Farm level
  - Root level sensors, satellite imagery, weather forecasts
  - Trickle irrigation
  - Drainage
  - Reservoirs
- Research
  - Drought , water logging resistant crops
  - Soil structure
- Regulatory
  - Abstraction reform
  - Catchment level

Metaldehyde

- Anglian Water couldn’t refill reservoirs at key stages last autumn
  - Farmers used up to 6 times past levels and still lost crops

How satellites can help in future

- “Automated” agronomist looking at crops
- Disease prediction affecting chemical requirement
- Stressed crops showing irrigation/fertiliser requirement
- Yield predictions, market signals
- Ecosystem assessments: eg tree health, soil quality, habitat

A systems approach

- Achieve sustainable intensification
  - Low energy, intelligently targeted inputs
  - Plant scale operations
  - Very low compaction