

# FarmDESIGN & CLCA Systems

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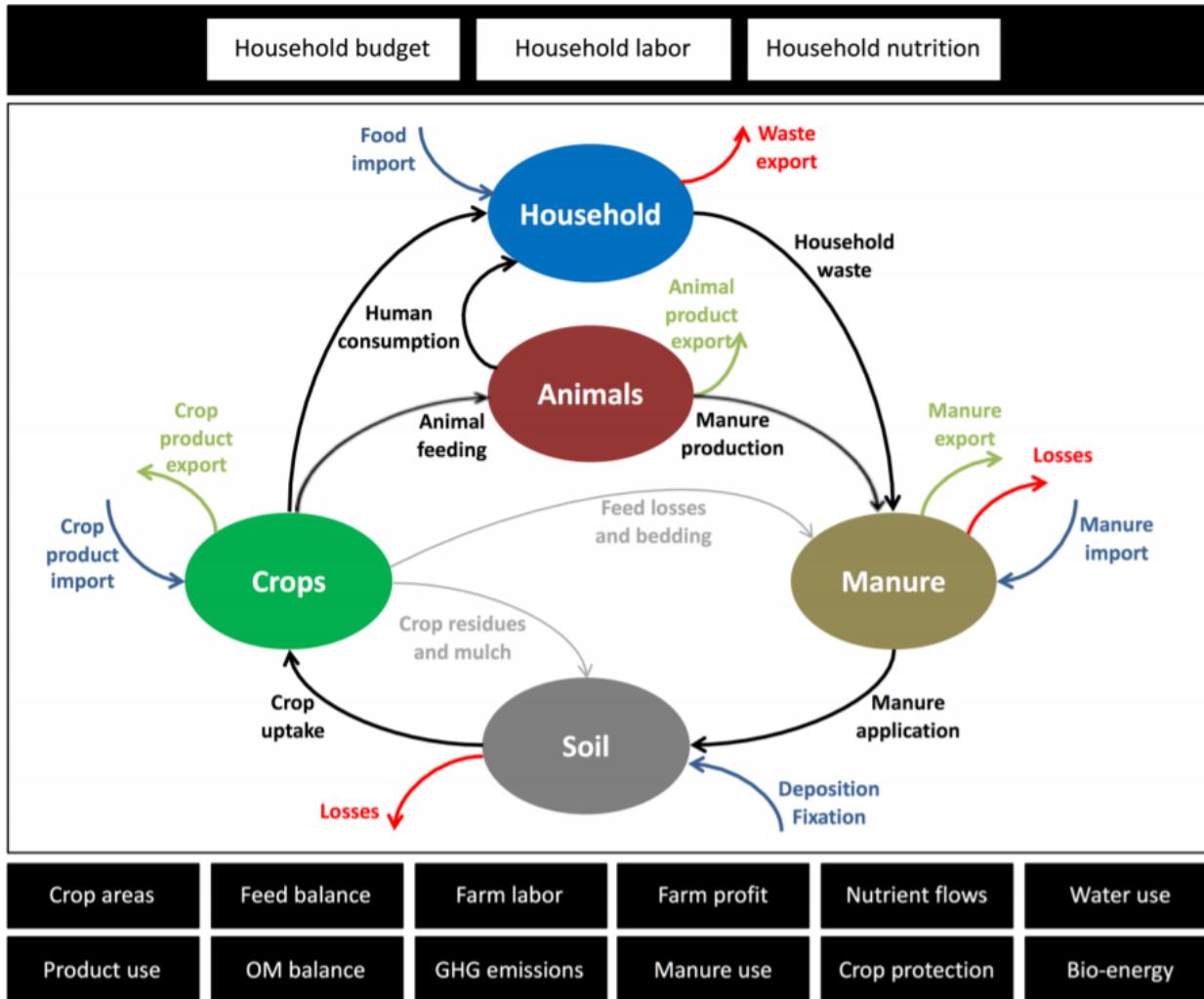
WUR - Farming Systems Ecology Group  
ICARDA



# Relation land-use and farm mgt. to indicators

- How can we adjust:
  - Crop areas, product composition, use
  - Animal number, mgt., productivity, product composition, use
  - Manure management
  - Food acquisition
  - Labor use
  - And other farm and household choices
- To **improve performance of multiple functions?**...
- ...and which tradeoffs and synergies do we face?

# Components, flows and modules

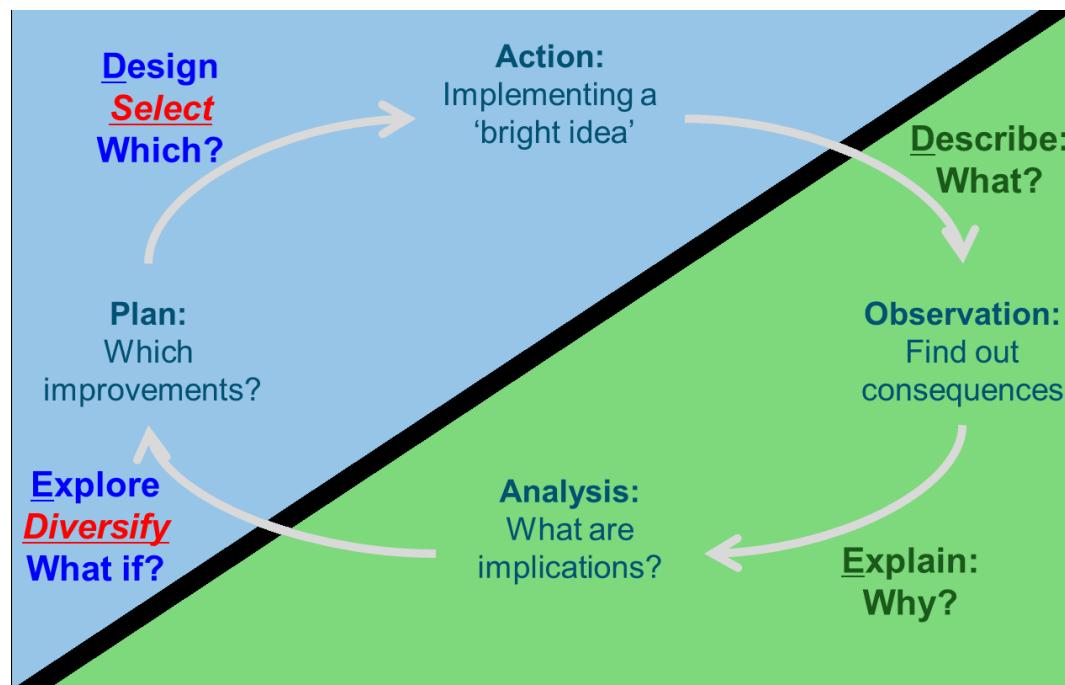


# FarmDESIGN: Data input



# DEED-circle

- **Describe** the farm system and its components
- **Explain** the performance with many indicators
- **Explore** new options for farm configuration
- Support the (re)**Design** of the farm



(Kolb, 1983; Tittonell, 2007;  
Giller et al., 2008)

# Windows of FarmDESIGN

Groot et al., 2012. Agricultural Systems.

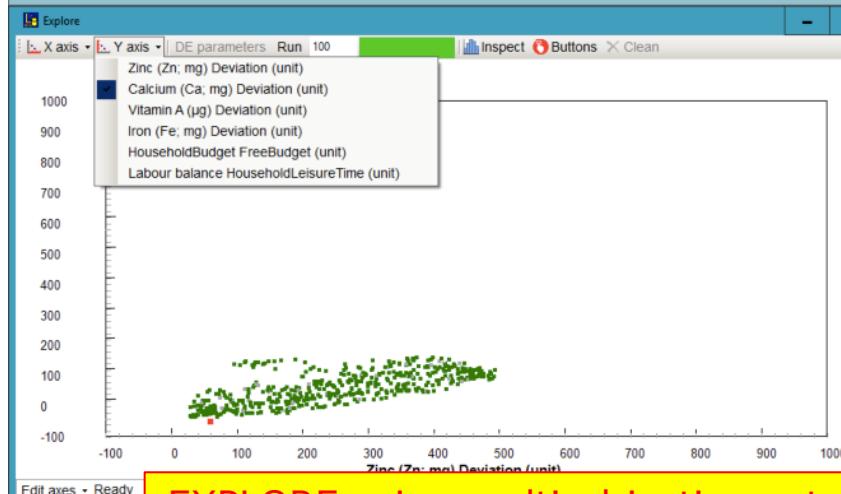
**DESCRIBE by data entry**

The screenshot shows the FarmDESIGN interface with the 'Design' tab selected. On the left is a tree view of the model structure under 'DK\_Model\_FoodC\_2SD'. The 'Animals' branch contains entries for Beef, Pig, Fish, Chicken, and External food. The 'Households' branch contains entries for HH1 through HH6. The central panel displays a data entry form for Household HH1, including fields for Name (HH1), Age (44), Gender (Male), Physiological state (Normal), Body weight (0 kg), Length (0 cm), Regular labor (2496 hours/year), Casual labor (0 hours/year), Off-farm labor (0 hours/year), and Consumer units (1). The status bar at the bottom indicates 'Farm data and model completely initialized | Selected: HH1'.

**EXPLAIN with indicators**

The screenshot shows the FarmDESIGN interface with the 'Explain' tab selected. It displays an 'Overview crop areas and rotations' section with 'Species richness and evenness indicators'. Two values are shown: Margalef Index (species richness) at 1.3403 and Shannon Index (species evenness) at 1.6915. Below this is a section titled 'Whole farm crop areas' with a green highlighted value of 1.6311. A list of crops and their associated values follows:

4038_Spring onion six seasons include	0.0225
11116_Pak choi three seasons include	0.0225
1008_Maize two seasons include	0.6400
Elephant grass Vietnam	0.0000
4029_French bean 3 seasons interventions	0.4100
4083_Water spinach intervention	0.0000
4016_Mustard greens intervention	0.0000
4003_Pumpkin include	0.0000
4020_Radish_vietnam	0.0000
External frost	0.0000



**EXPLORE using multi-objective opt.**

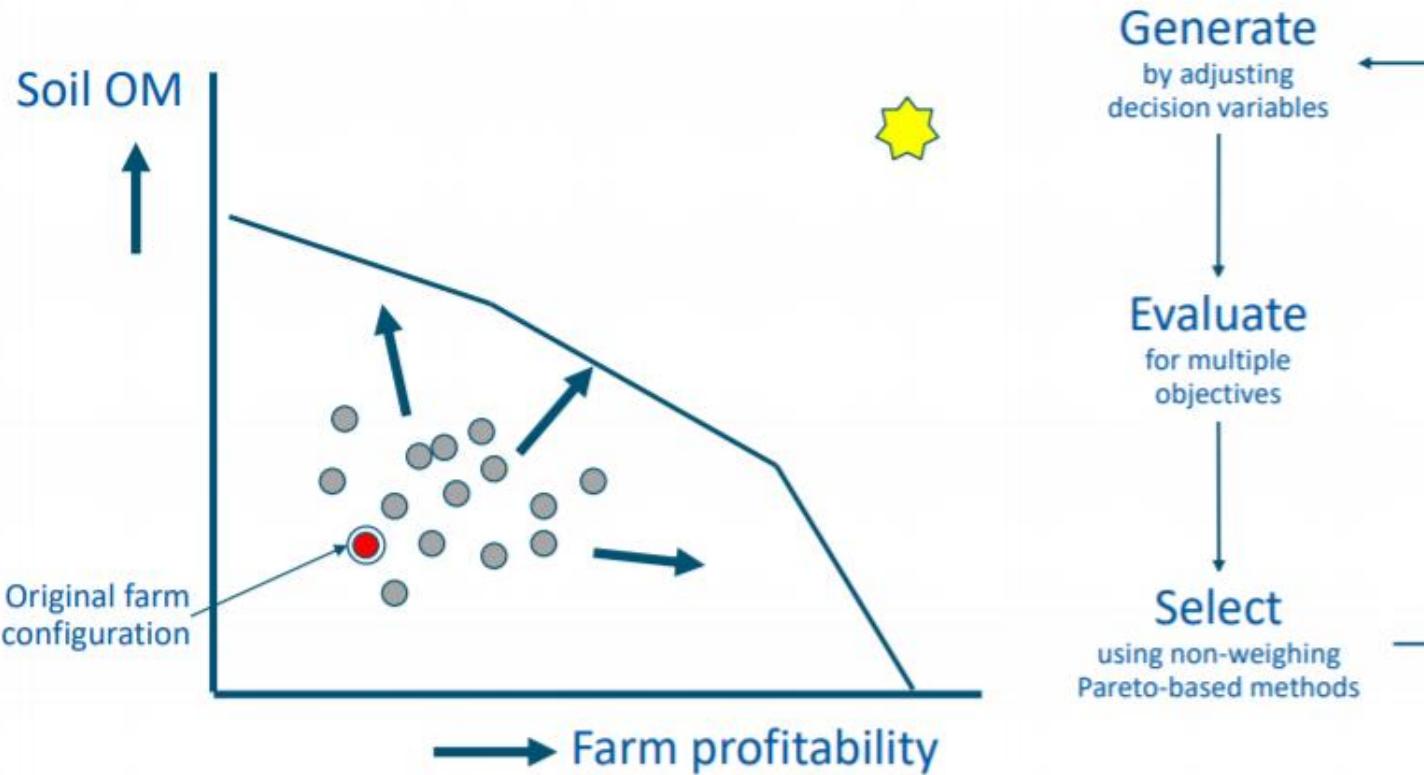
The screenshot shows the FarmDESIGN interface with the 'Evaluate' tab selected. It displays a table titled 'Check decision variables' with columns for Description, Minimum, Maximum, and Value. The table lists various parameters with their respective ranges and current values:

Description	Minimum	Maximum	Value
3017_Peanuts P ToHomeUse	0	10.24	2.54
1004_Rice P ToHomeUse	0	2000	733.08
3010_Mung bean P ToHomeUse	0	42.02	7.74
4030_Cowpea beans ToHomeUse	0	42.02	0.00
11026_Bamboo shoots P ToHomeUse	0	17.85	5.29
3004_Black bean P ToHomeUse	0	44	9.14
5002_Orange P ToHomeUse	0	3.5	0.98
4003_Pumpkin P ToHomeUse	0	14.28	1.90
2013_Taro P ToHomeUse	0	25.84	3.91
4005_Tomato P ToHomeUse	0	12.09	1.27
5011_Water melon P ToHomeUse	0	3.05	0.98
5006_banana fruit ToHomeUse	0	76.21	18.38
4010_Cabbage ToHomeUse	0	18.19	4.43
4029_French bean ToHomeUse	0	4.7	1.03
5040_Guava fruits ToHomeUse	0	25.01	5.39

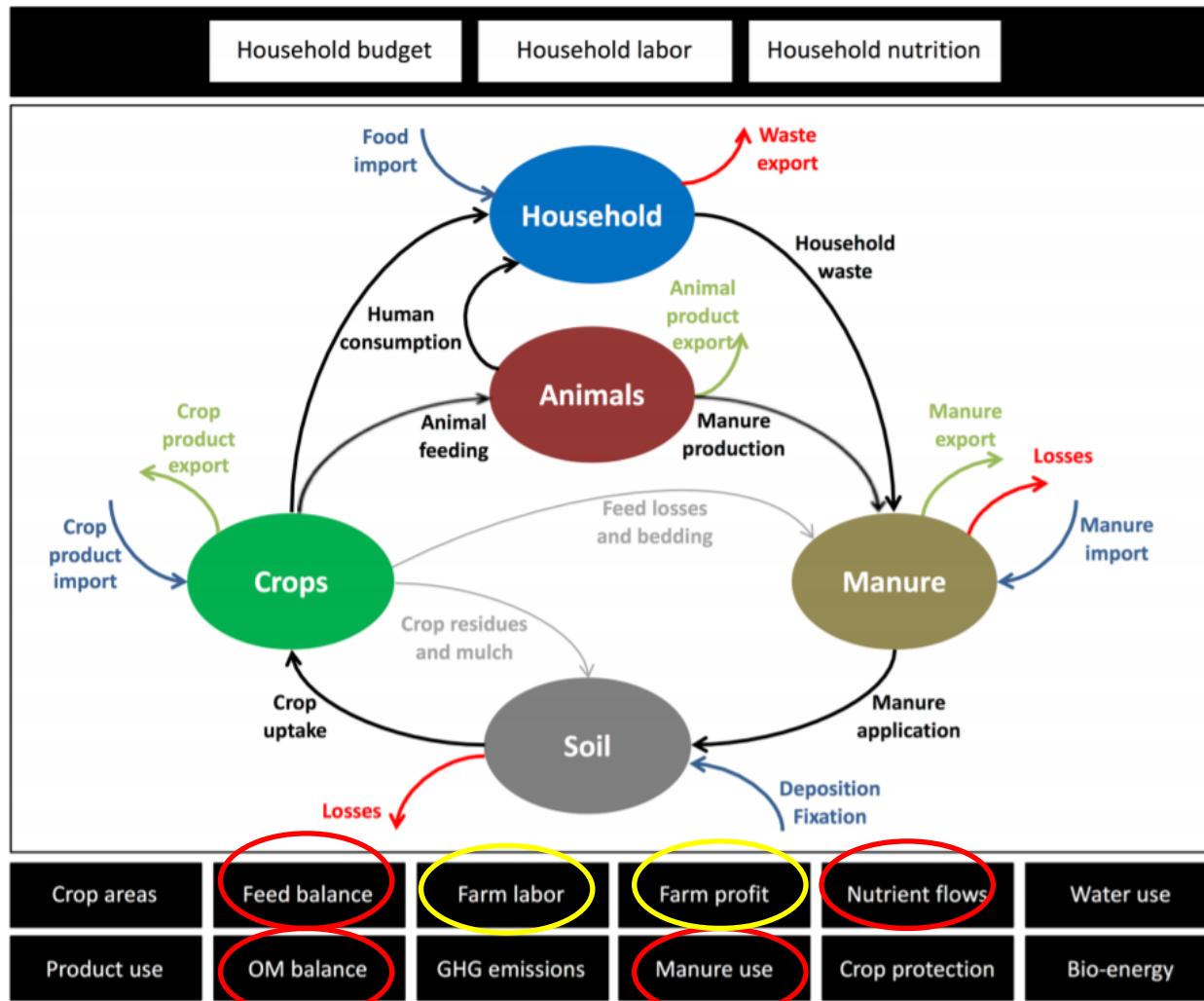
**EVALUATE settings optimization**



# Pareto-based Optimization



# FarmDESIGN & CLCA



# Thank you



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# References

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<http://www.ecologyandsociety.org/vol13/iss2/art34/>.