SELF-SUFFICIENCY: MOTIVATION, EXECUTION, RESULTS

Neaman Institute
28 May 2025

Dr. Alik Pelman

HAPPY TO BE HERE

Philosopher

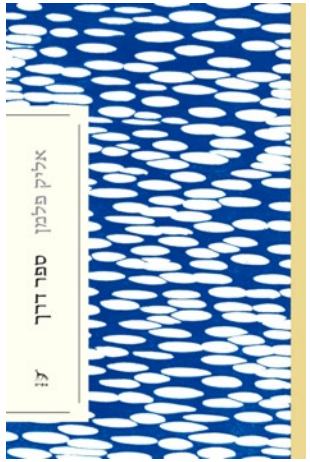
Research Fellow, Technion
Assis. Prof., Shenkar

Homesteader

Pelman's Homestead

Author

Way – An Enquiry Into The Art of Living



TECHNION
Israel Institute of Technology

HUMANITIES
AND ARTS

HUMANITIES IN STEM

- Research: ongoing collaborations
- Teaching: Philosophy of science and technology; Ethics of science and technology
- Embedded Ethics modules
- New study programs: e.g., the newly approved **Engineering Leadership Program** (headed by Prof. Arnon Bentur)

STRUCTURE OF TALK

1. **Motivation:**

   Self-Sufficiency as Ethics

2. **Execution:**

   Dwelling; Food

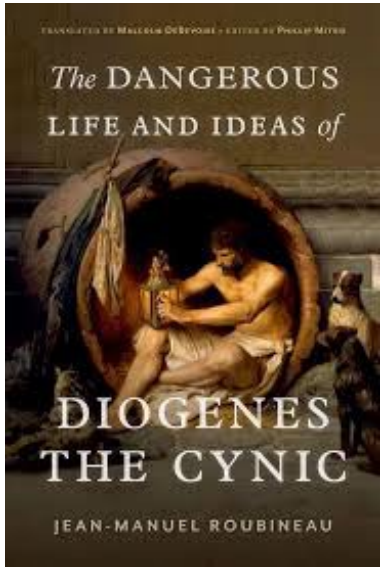
3. **Results:**

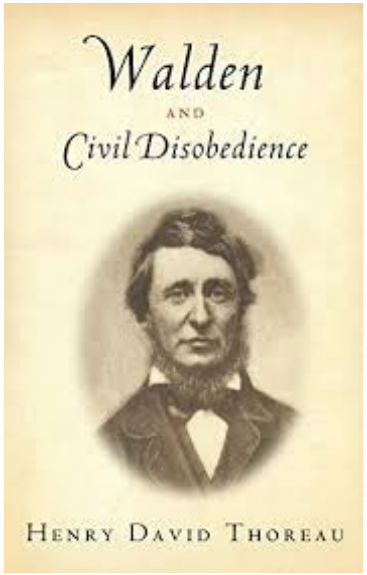
   Nutrition; Environment

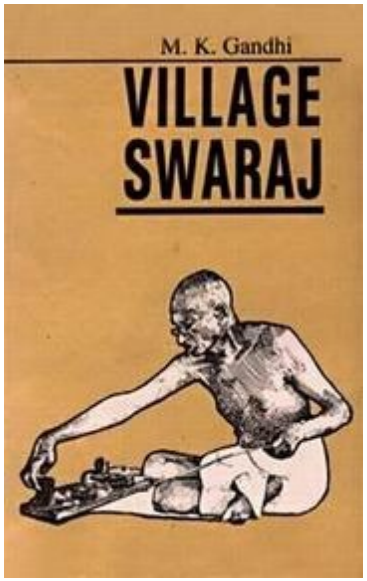
4. **Conclusion**

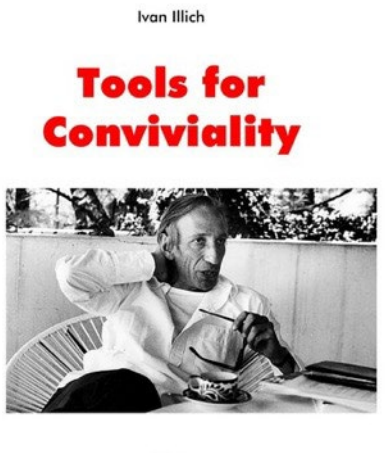
I. MOTIVATION

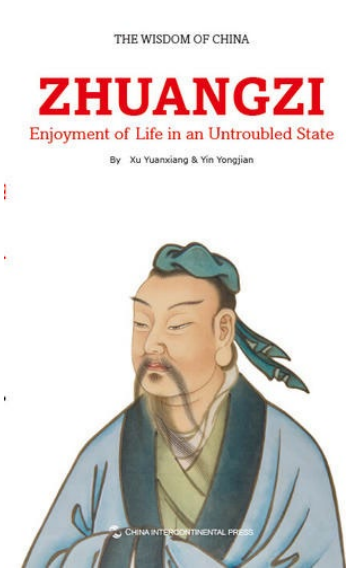
A 2500-YEAR TRADITION

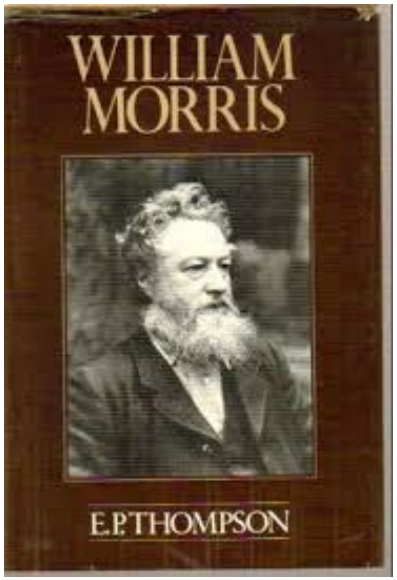


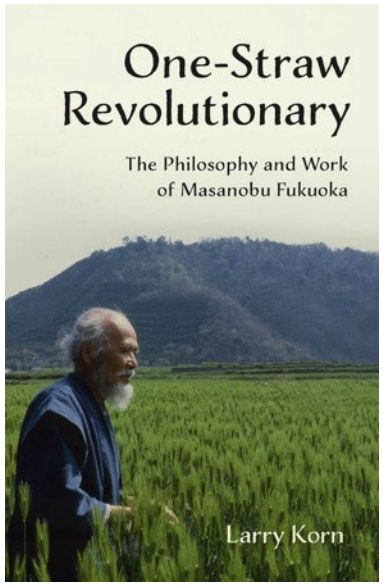


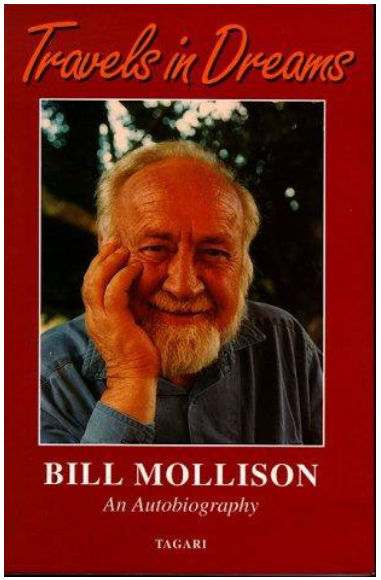










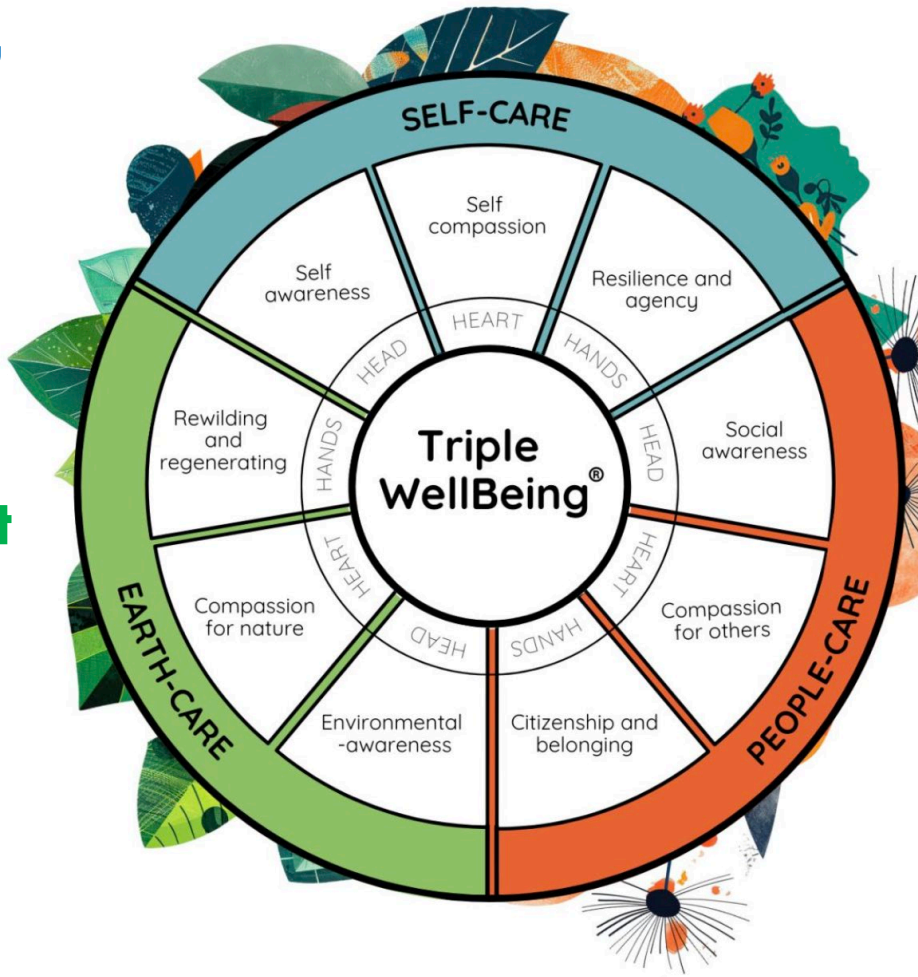


A 2500-YEAR TRADITION

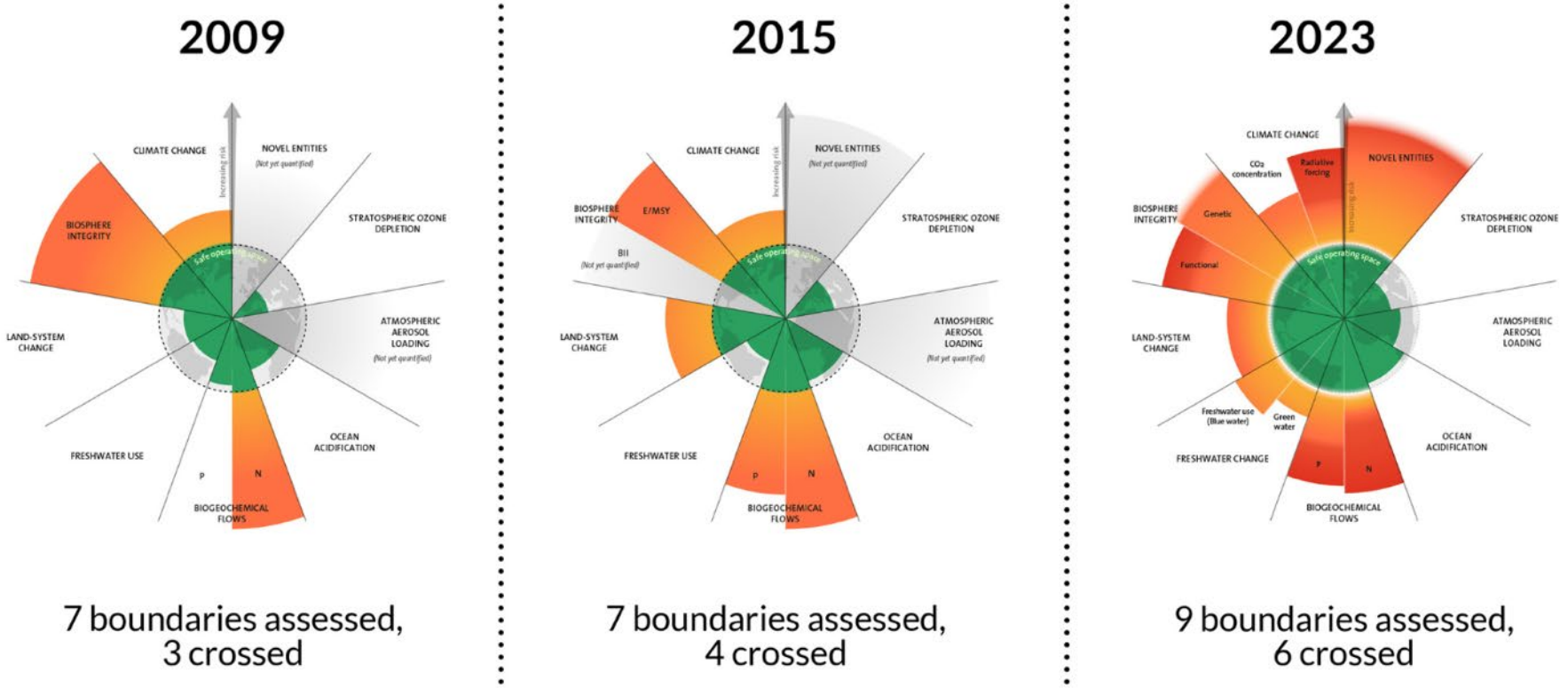
THE THREE PILLARS OF ETHICS

Ethics: 'What ought I to do?'

1. Concerning **other people**
2. Concerning **the environment**
3. Concerning **myself**

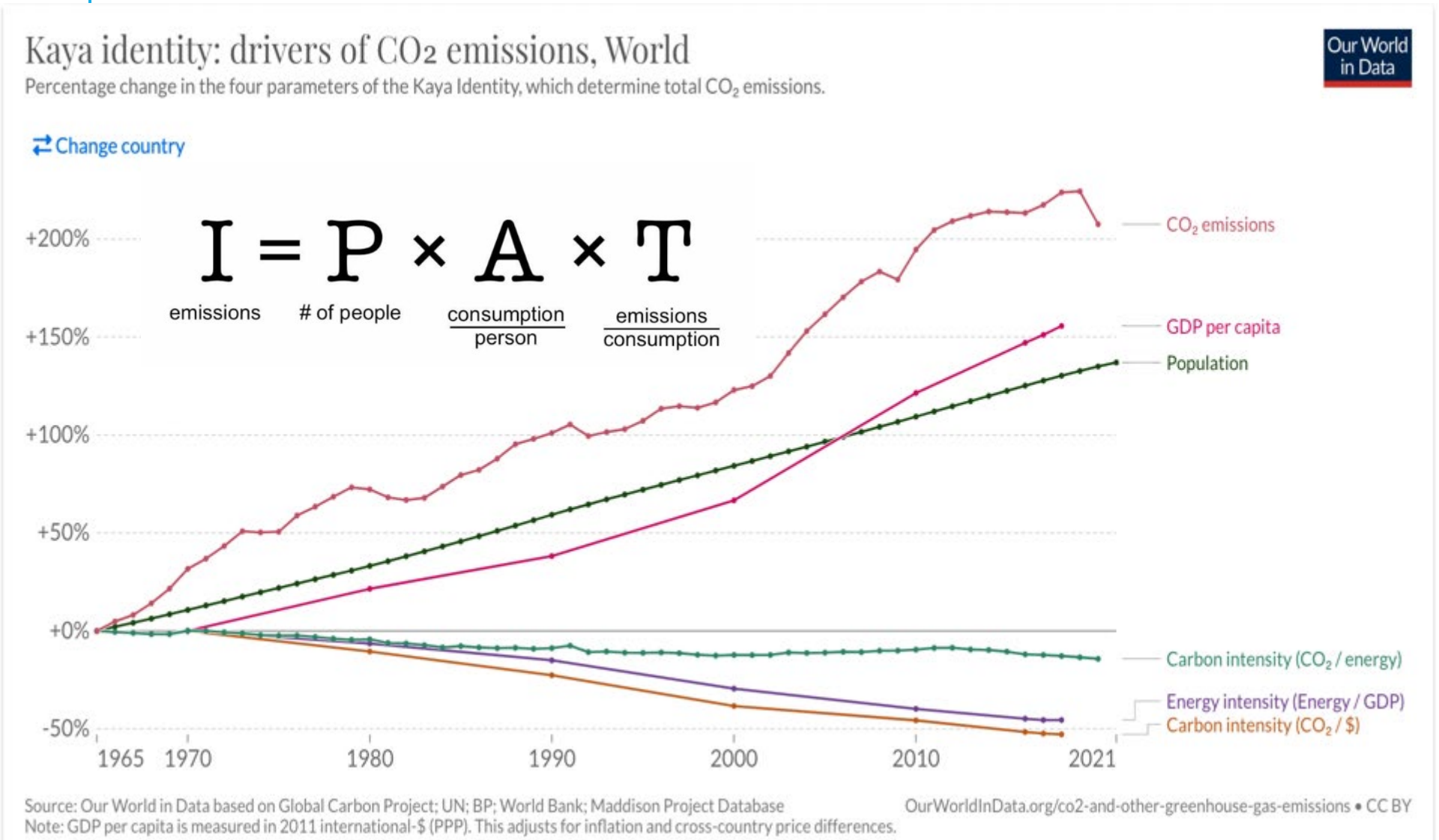


1. ENVIRONMENTAL DEGRADATION



Azote for Stockholm Resilience Centre, Stockholm University. Based on Richardson et al. 2023, Steffen et al. 2015, and Rockström et al. 2009)

1. ENVIRONMENTAL DEGRADATION



2. SOCIAL EXPLOITATION – MODERN SLAVERY

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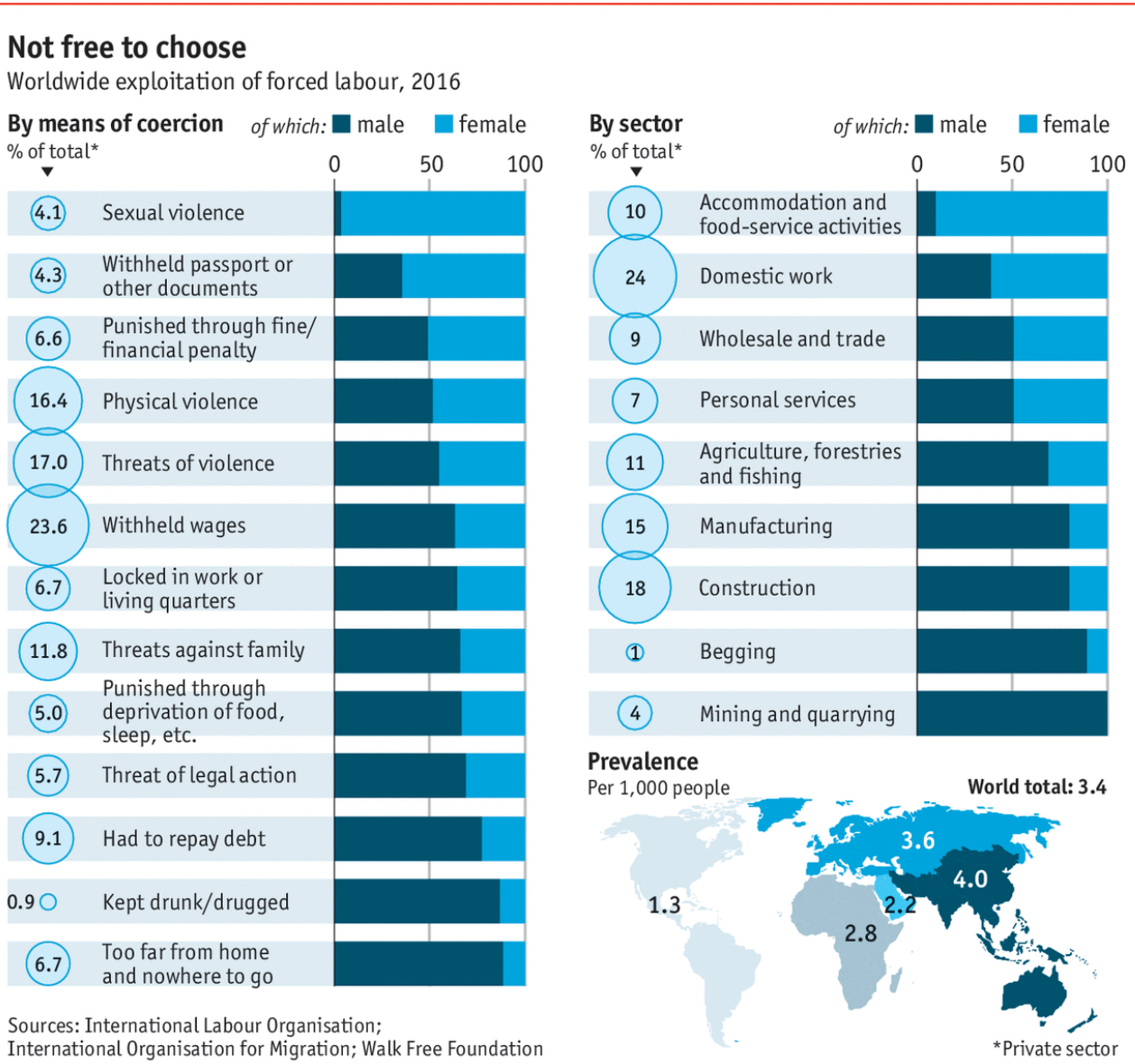
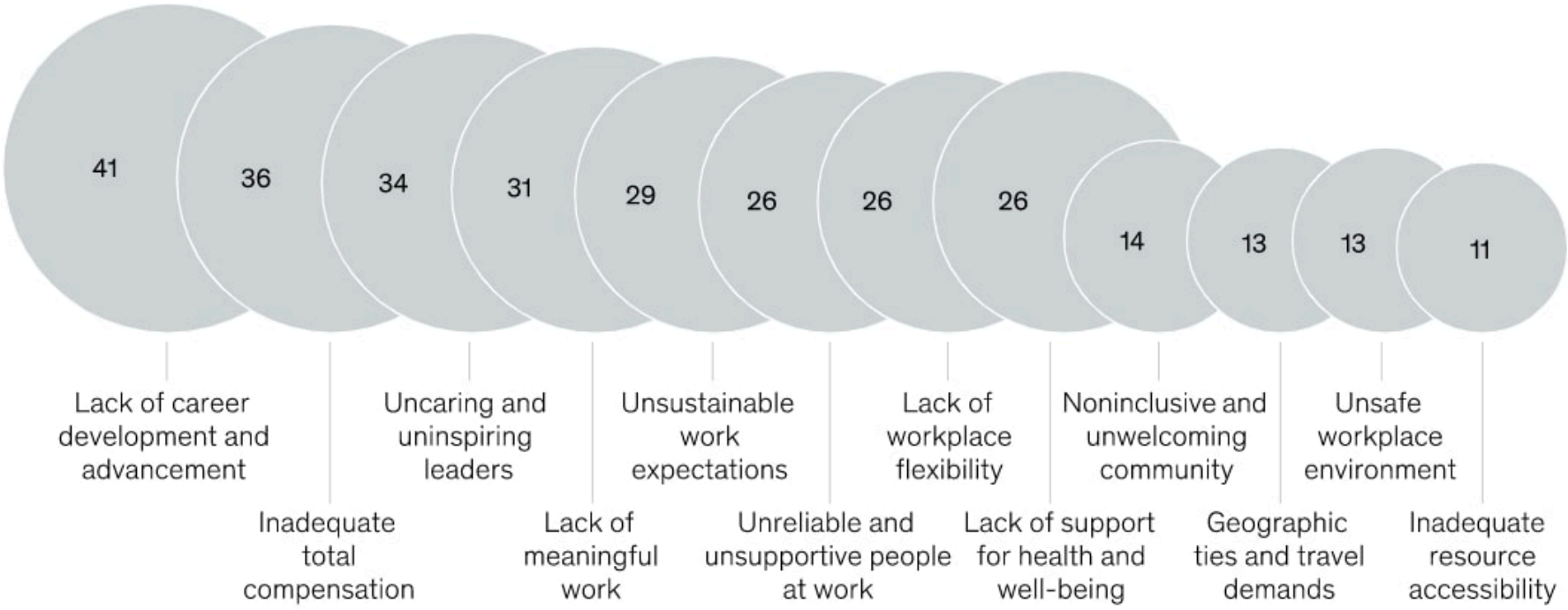


3. PERSONAL LACK OF AUTONOMY

Top reasons for quitting previous job, Apr 2021–Apr 2022, %

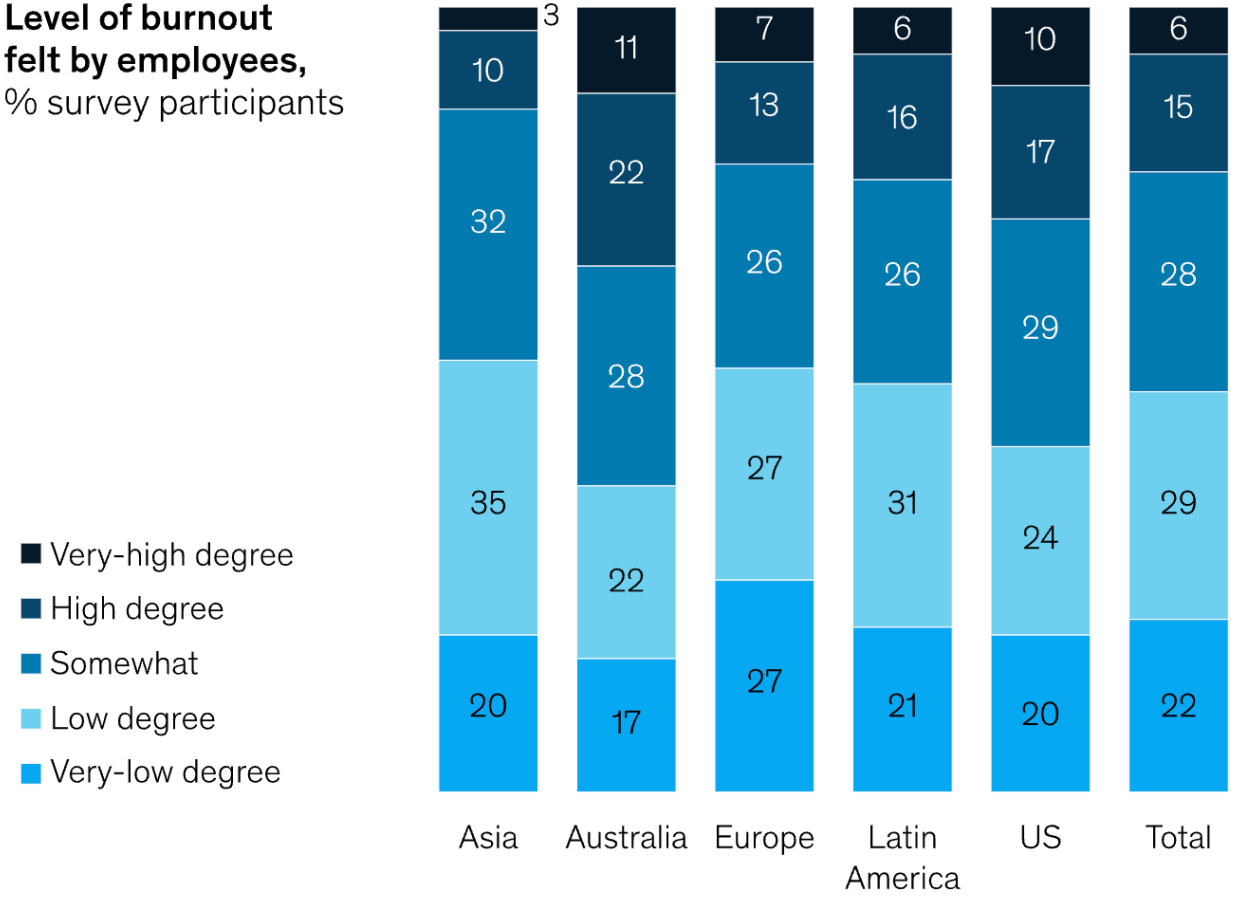


Source: Subset of respondents from McKinsey's 2022 Great Attrition, Great Attraction 2.0 global survey (n = 13,382), including those currently employed and planning to leave (n = 4,939), those currently employed and planning to stay (n = 7,439), and those who quit their previous primary jobs between Apr 2021 and Apr 2022 (n = 1,154)

McKinsey & Company

3. PERSONAL LACK OF AUTONOMY

Level of burnout felt by employees,
% survey participants



49%
of respondents say they are feeling at least somewhat burned out

Note: Burnout is likely underrepresented by our sample of full-time employees, as employees experiencing burnout are less likely to respond to survey requests, and those who feel most burned out may have already left the workforce.
Source: Reimagine Work: Employee Survey (Dec 2020–Jan 2021, n = 5,043 full-time employees who work in corporate or government settings)

3. PERSONAL:
VIRTUE ETHICS THROUGH SELF-SUFFICIENCY

- Enhanced freedom
- Multidimensionality
- Understanding material cycles ”from within”
- Proximity to nature
- Simplicity
- Aesthetics

איזה נער התקדם יותר בסופו של חודש – זה שעשה את אולרו שלו מן הבצר שהוא עצמו חפר והתיך, מתוך קריאה בעניין זה בכל הדרוש לשם כך, או זה ששמע באותו זמן הרצאות באינסטיטוט על עבודות מתכת וקיבל במתנה אולר רוג׳רס מאביו? מי משניהם עלול יותר לחתוך את אצבעותיו?

הנרי דוד ת׳ורו, וולדן, 1854

OVERALL ETHICAL STRUCTURE

OVERALL ETHICAL STRUCTURE

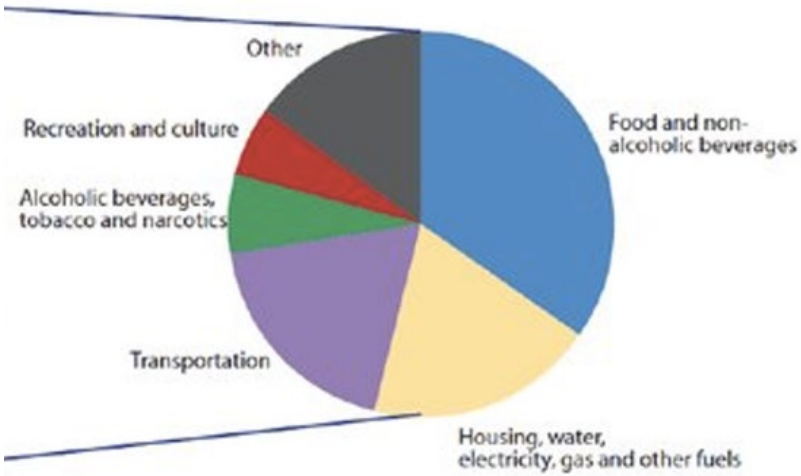
		Means: Self-sufficiency	
		Minimizing Wants	Maximizing Provisioning
Ends: Ethics	Self-regarding (virtue ethics)		
	Social-responsibility		
	Environmental-responsibility		

OVERALL ETHICAL STRUCTURE

		Means: Self-sufficiency	
		Minimizing Wants	Maximizing Provisioning
Ends: Ethics	Self-regarding (virtue ethics)	Antiquity; Modernity	Modernity
	Social-responsibility	Medieval; Modernity	Medieval; Modernity; Contemporary
	Environmental-responsibility	Modernity; Contemporary	Modernity; Contemporary

II. EXECUTION

SELF-SUFFICIENCY "LAB" I



- Self-sufficiency in:

1. Dwelling; 2. Food

- Reasons:

1. Biggest impact; 2. Feasible; 3. Basic.

- Source of confidence:

- People have been doing it for many millennia

II. EXECUTION 1:
DWELLING

METHOD

- 0 gr concrete
- No foundations – no disturbance to soil
- Natural materials (wood, soil, stone, wool)
- Mostly local materials
- Solar power
- Cooling: passive
- Heating: 'Rocket Stove Mass Heater'
- No sewage (composting toilet)
- Grey water recycling
- Self-built (with friends..)

GROUND WORKS + FRAMING

MINIMAL – ONLY COMPACTING SOIL ON 40 M^2 OF HOUSE

LENTILS, SIDES

LIVING ROOF
(SHEEP WOOL; OLD CARPETS)

LIVING ROOF

SOIL FROM AROUND THE HOUSE (TERRACES TO PREVENT SLIDING)

THE CLIMATE CHALLENGE

INDOOR WALLS
'THERMAL MASS': PEBBLES FROM AROUND THE HOUSE

EXTERNAL WALLS INSULATION: SHEEP WOOL

FLOOR

STONE ON MUD, THEN OILED WITH COOKING OIL

SHOWER

TRADITIONAL LIME PLASTER

1. $CaCO_3 \rightarrow CaO + CO_2$.

2. $CaO + H_2O \rightarrow Ca(OH)_2$.

3. $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$.

COMPOSTING TOILET
NO BLUE WATER. NO SEWAGE

HEATING
ROCKET STOVE MASS HEATER

SOLAR POWER

FURNITURE

II. EXECUTION 2:
FOOD

METHOD

Farm's design goals:

1. **Nutrition-oriented:**

To meet Recommended Dietary Allowances (**RDA**) – **balanced diet**

2. **Environment-oriented:**

Cause minimum negative environmental impacts.

Very different from profit-oriented industrial farming.

PLAN OF AGROECOLOGICAL FARM

Minimum impacts

- No chemicals
- No plough ('no-dig')
- Seasonal
- Local varieties
- Crop-rotation
- Small-scale tools
- Maximum rainfed

Maximum nutrition

- Crops mix with high nutritional yield
- Spatial overlap (*intercropping*)

PLAN OF AGROECOLOGICAL FARM

	Wheat	Pulses	Olive oil	Vegetables	Total	Calories
Grams/day						
Carbs (grams)					274 gr	**1000**
Fat (grams)					76 gr	**600**
Protein (grams)					106 gr	**400**
Calories						**2000**
Kg/year						
Plot size (m^2)						

PLAN OF AGROECOLOGICAL FARM

	Wheat	Pulses	Olive oil	Vegetables	Total	Calories
Grams/day	**125**	**225**	**65**	**1000**	1415 gr	
Carbs (grams)	90	131	0	52.5	274 gr	**1000**
Fat (grams)	3	4.5	65	3.5	76 gr	**600**
Protein (grams)	16.5	59	0	30	106 gr	**400**
Calories	426	768	526	280		**2000**
Kg/year						
Plot size (m^2)						

PLAN OF AGROECOLOGICAL FARM

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Protein (grams)	16.5	59	0	30	106 gr	**400**
Calories	426	768	526	280		**2000**
Kg/year	**46**	**84**	**25**	**365**		
Plot size (m^2)	**200**	**350**	**50**	**150**	**750**	

PLAN OF AGROECOLOGICAL FARM – VEG GARDEN

CEREALS, PULSES (WHEAT, FAVA) AND OLIVE OIL

VEGETABLES

INPUTS

	Vegetables	Olive oil	Pulses	Wheat	Honey	Carob	Misc	Total
Harvest (kg/year)	535.7	40	84	48	15	5		
Plot size (m2)	140	45	350	200	1	5		741
Irrigation (m3)	50	-	-	-	-	-		50
Labor (days/year)	4	2	2.5	1.5	1	0.5	1	12.5 days
Petrol (liters/year)	10		14	9				33
Compost (m3)	3	1	-	-				4

RESULTS

PELMAN ET AL (2024) 'A LIFE-CYCLE APPROACH HIGHLIGHTS THE NUTRITIONAL AND ENVIRONMENTAL SUPERIORITY OF AGROECOLOGY OVER CONVENTIONAL FARMING: A CASE STUDY OF A MEDITERRANEAN FARM'

PLOS SUSTAINABILITY AND TRANSFORMATION 3(6)

Dr. Alik Pelman
Department of Humanities and Arts, Technion

Prof. Gidon Eshel
Physics Department, Bard College, Annandale-on-Hudson, NY

Prof. Jerke de Vries
Applied Research Centre, VHL University of Applied Sciences, Netherlands

Prof. Yohay Carmel
Faculty of Civil and Environmental Engineering, The Technion

Dr. Sigal Tepper
Department of nutritional studies, Tel Hai College

Dr. Alon Shepon
The Porter School of the Environment and Earth Sciences, Tel Aviv University

METHOD

Goal of research: comparison

	Env. Impacts	Nutrition
BAU		
AGRO		

METHOD

Goal of research: comparison

	Env. Impacts	Nutrition
BAU		
AGRO		
MIX		

METHOD

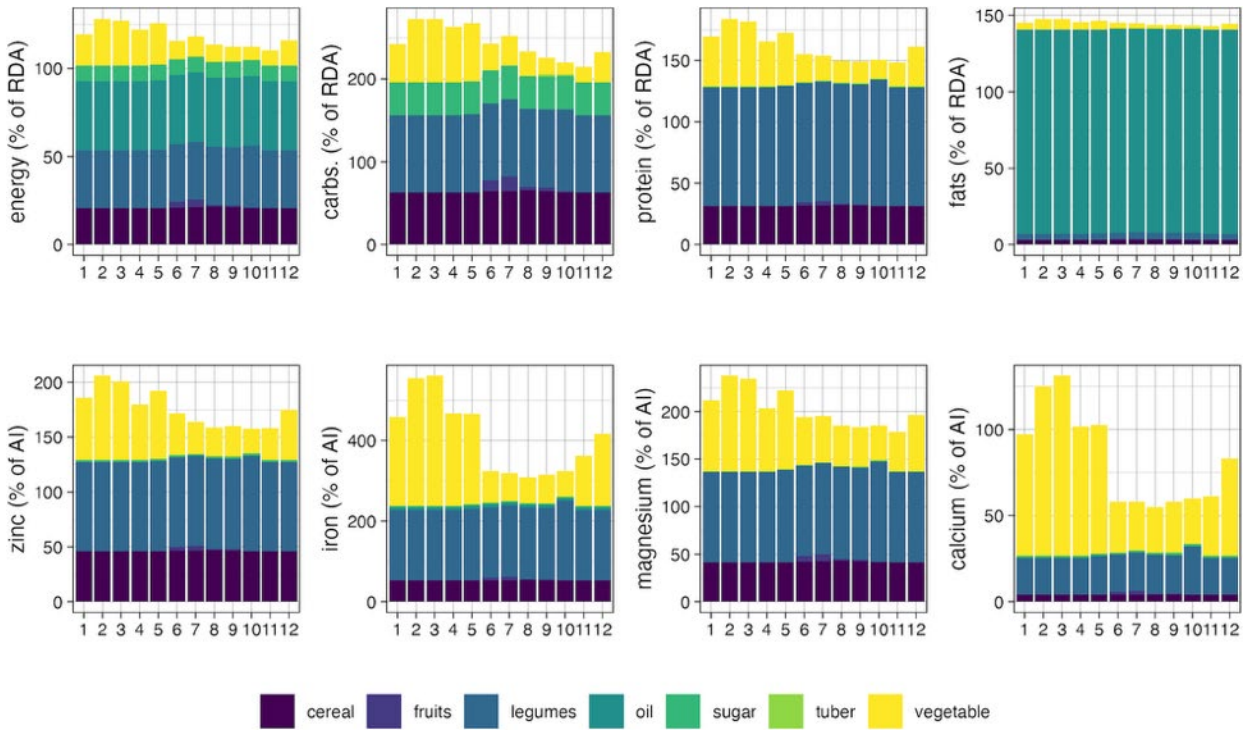
Goal of research: comparison

	Per unit mass		Per unit area	
	Env. Impacts	Nutrition	Env. Impacts	Nutrition
BAU				
AGRO				
MIX				

RESULTS: FOOD SECURITY IN AGRO

- **RDA**: meets or exceeds.
- **Calcium**: 60%-130%. The limiting factor
- **Macronutrients distribution**: 49% carbs, 37% fats, 14% protein.

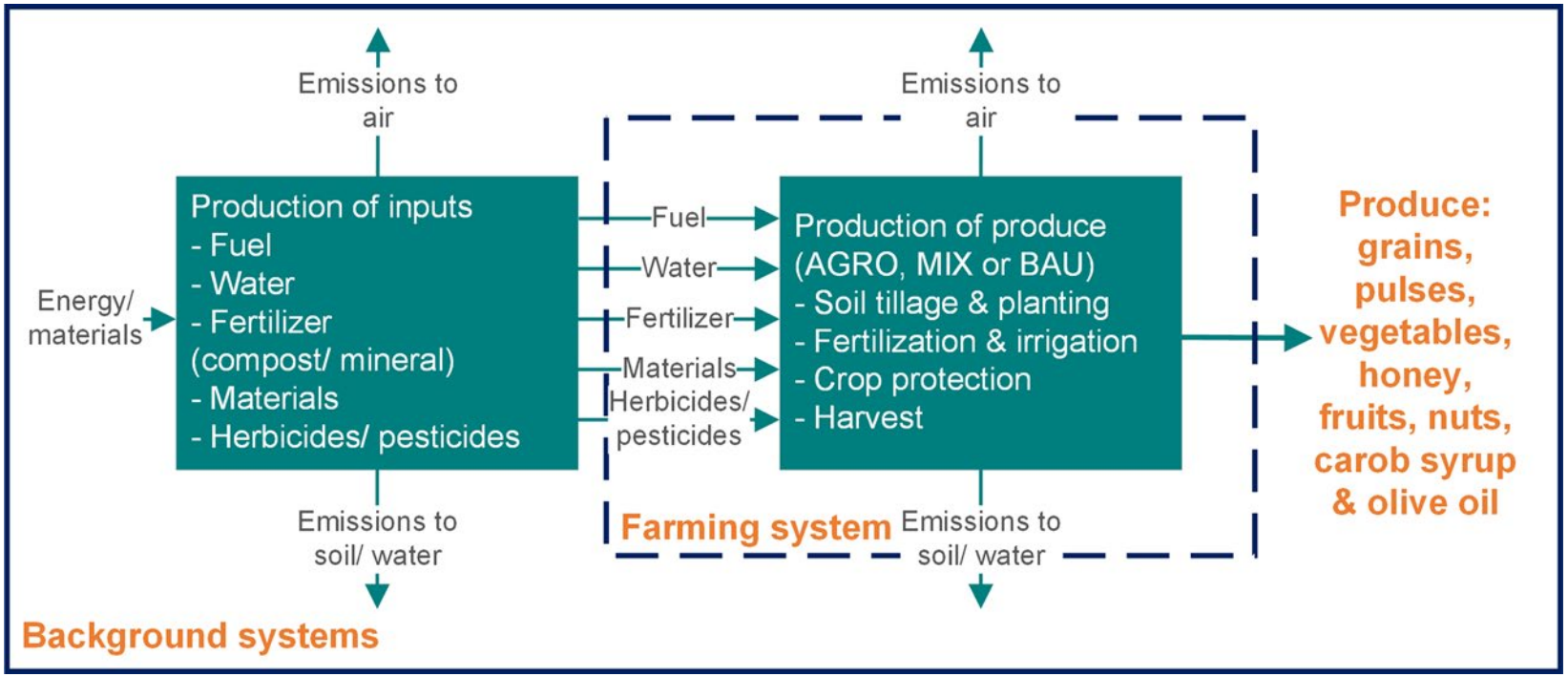
meets AMDR (55%-70%, 20%-35%, and 10%-35% of total calories respectively).



COMPARATIVE STUDY

AGROECOLOGY VS. CONVENTIONAL FARMING

LCA – CRADLE TO FARM GATE



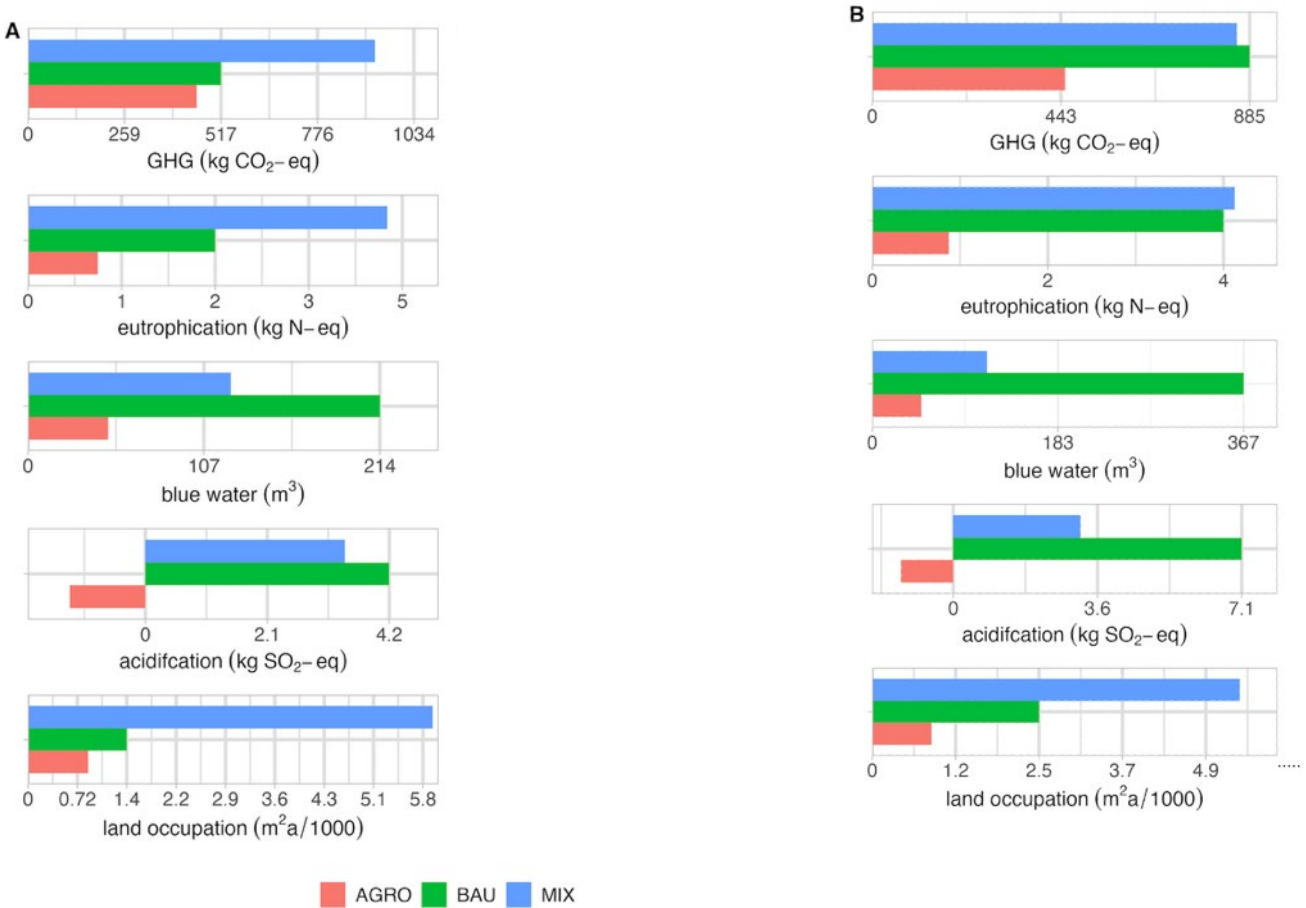
COMPARISON: ENVIRONMENTAL IMPACTS (LCA)

Per unit mass

AGRO's av. Impact:
37% of BAU

Per unit farmed area

AGRO's av. impact:
21% of BAU



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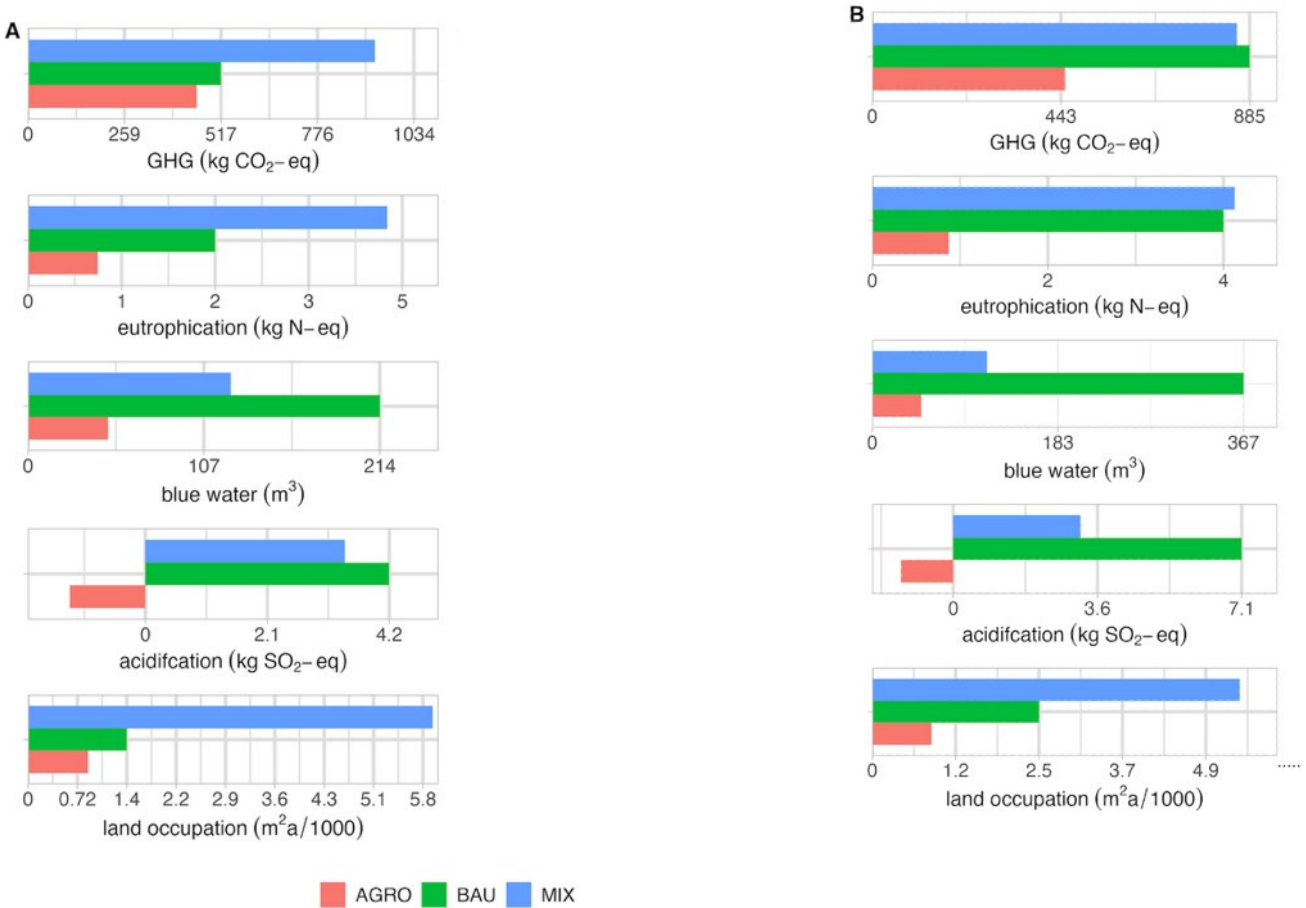


FARMLAND VS. TOTAL LAND USE

Note: 'land use' includes ***all*** land used for crop production: farmland + land transformations and changes and land needs of producing **fuel, materials, fertilizer** and their related **infrastructure** and activities.

Hence, **total land use** for conventional farming is **290%** that of agroecology, per the **same farmland** area.

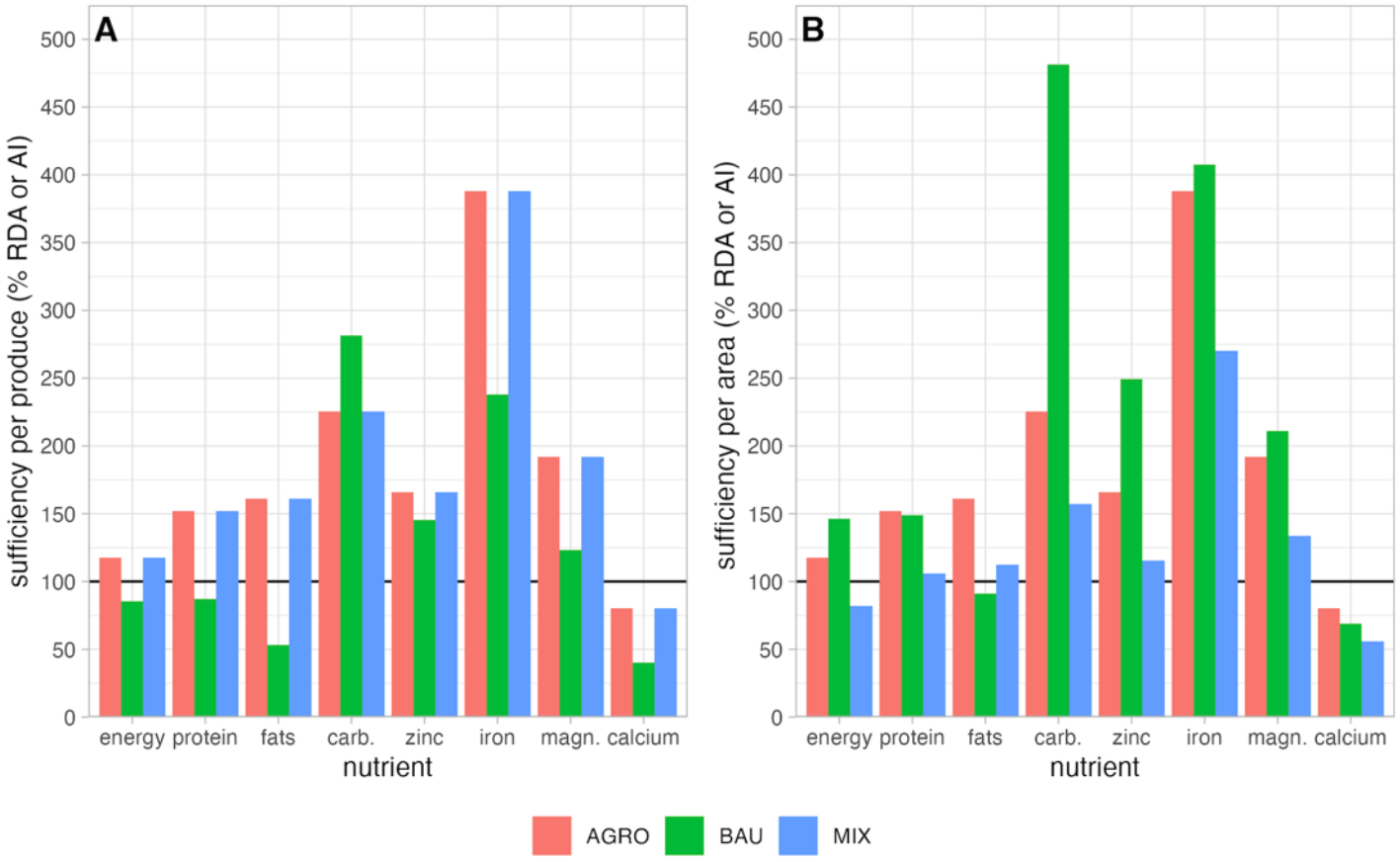
COMPARISON: NUTRITIONAL OUTPUT

Per unit mass

AGRO's av. output:
166% of BAU

Per unit farmed area

AGRO's av. output:
97% of BAU



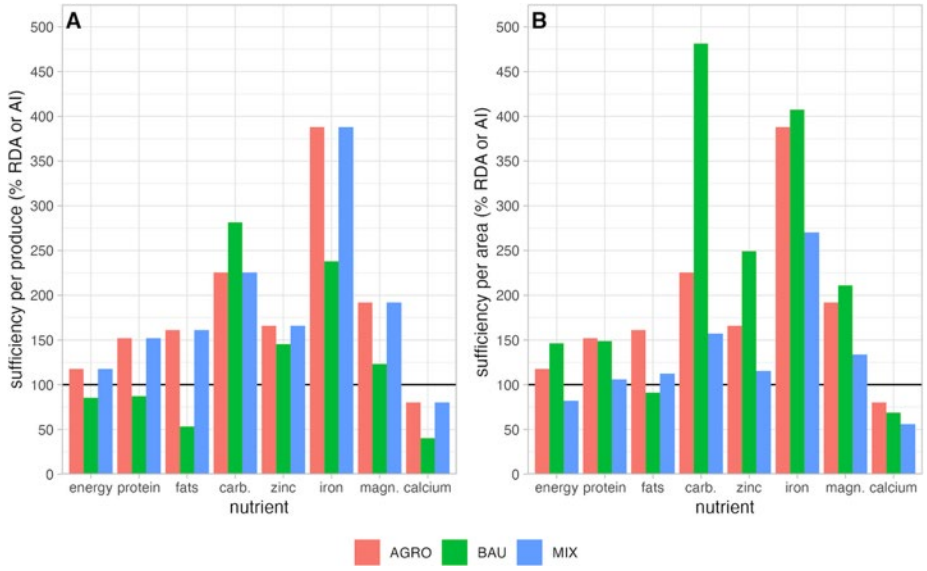
NUTRITIONAL COMPARISON - ANALYSIS

Per **unit mass:** AGRO crops more (66%) **nutritionally dense.** Due to **crops mixture**.

Per **unit farmed area:** Although AGRO more **nutritionally dense, it produces** a slightly lower (3%) **nutritional yield** (i.e., less nutrients per m^2).

Cause: **total yield** (i.e., mass per area) of BAU is greater

However, the larger yields are achieved via larger inputs and greater environmental **negative impact**.



NUTRITIONAL COMPARISON - ANALYSIS

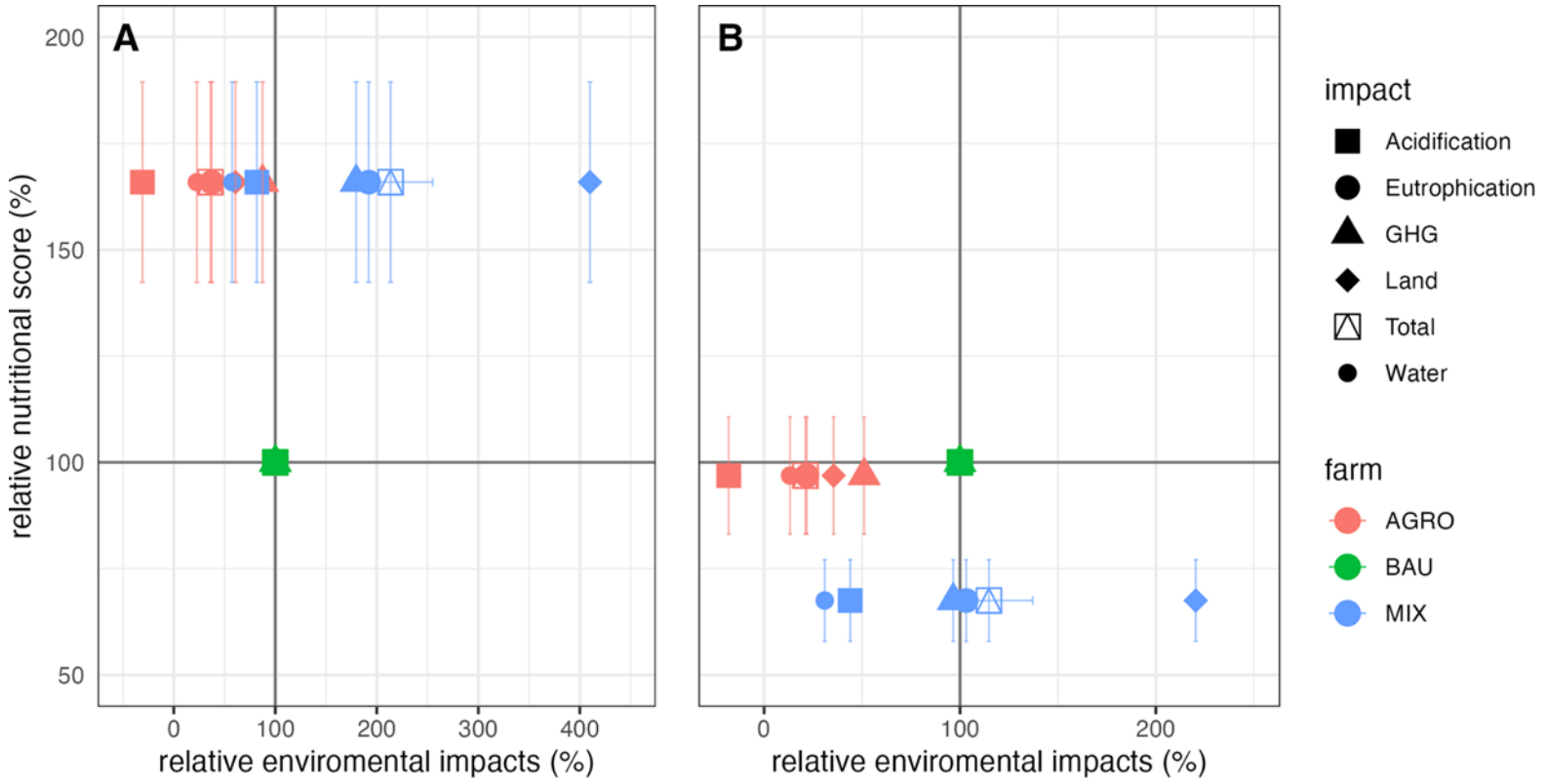
As mentioned, per unit farmed area, nutritional yield of AGRO is **97%** that of BAU.

But AGRO's yields are only about **50%** that of BAU.

How is it possible? 3 reasons:

1. **Intercropping**
2. **Mixture of crops** (with higher nutritional yield)
3. **Zero onsite waste**

COMPARISON: COMBINED NUTRITIONAL-ENVIRONMENTAL



Nutritional quality (y axis) is presented using a relative nutritional score compared to BAU.

COMPARISON: COMBINED NUTRITIONAL-ENVIRONMENTAL

	Per unit mass		Per unit farmland	
	Env. Impacts	Nutrition	Env. Impacts	Nutrition
BAU	100%	100%	100%	100%
AGRO	**37%**	**166%**	**21%**	**97%**
MIX	214%	166%	115%	68%

COMPARISON: COMBINED NUTRITIONAL-ENVIRONMENTAL

	Per unit mass		Per unit farmland		Per land use	
	Env. Impacts	Nutrition	Env. Impacts	Nutrition	Env. Impacts	Nutrition
BAU	100%	100%	100%	100%	100%	100%
AGRO	**37%**	**166%**	**21%**	**97%**	**21%**	**273%**
MIX	214%	166%	115%	68%	115%	31%

OVERALL

Per same area:

Environmental impact

Agroecology: 21% of the negative impact of conventional farming

Nutrition

Agroecology: 97% of the nutritional yield of conventional farming

But!

If we count **all land used** by industrial farming (farmland + area for: fertilizer, machines, fuels, irrigation…) its nutritional yield drops 2.9 times.

Hence,

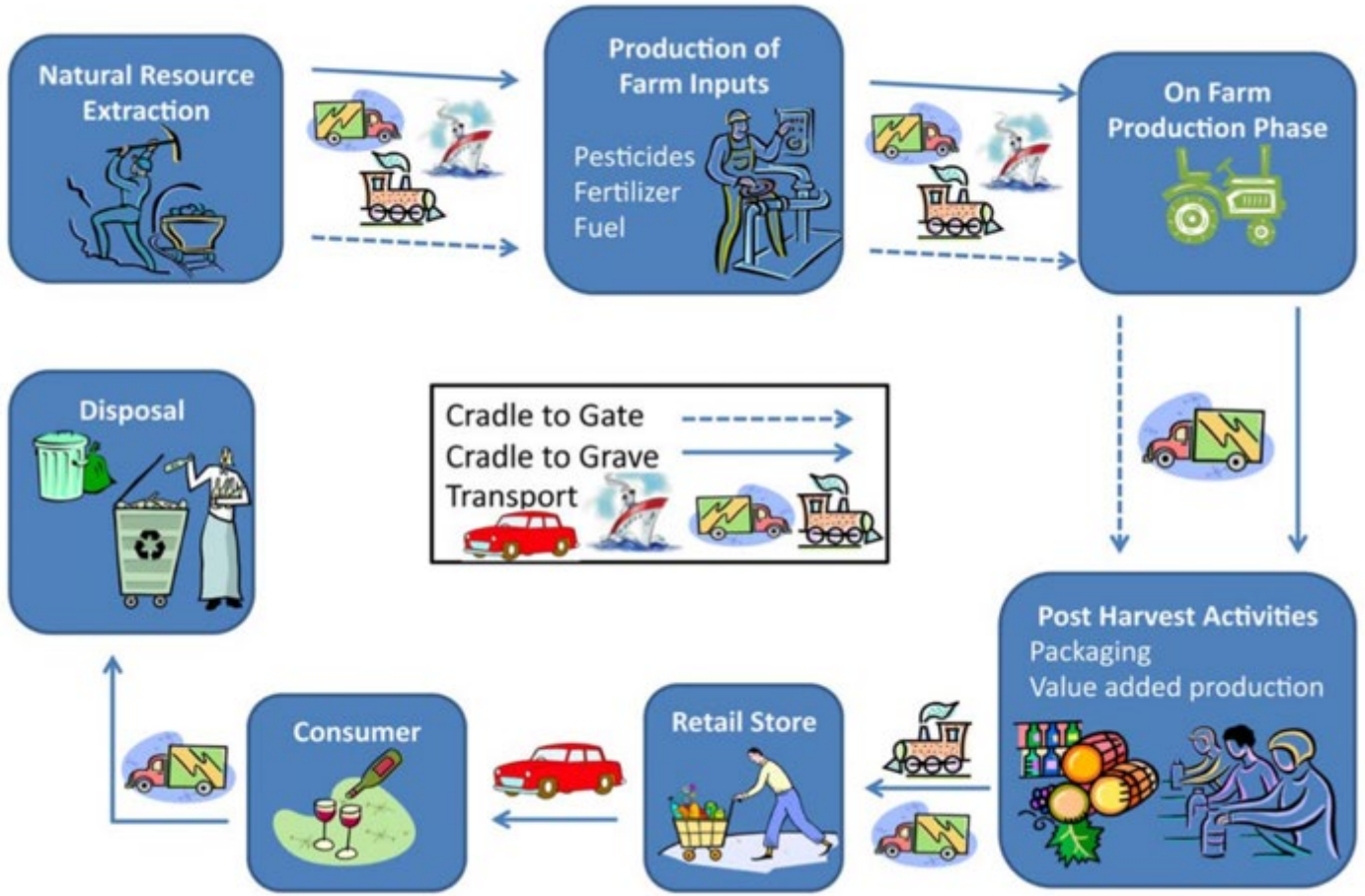
Agroecology: 273% of the nutritional yield of conventional farming !

TOTAL LAND USE VS. FARMLAND

In other words, if we were to replace **all land** occupied by industrial farming (directly and indirectly), with agroecology,
we would be able to feed **2.7 times** more people, with merely **21%** of the environmental impact.

POST GATE: LCA

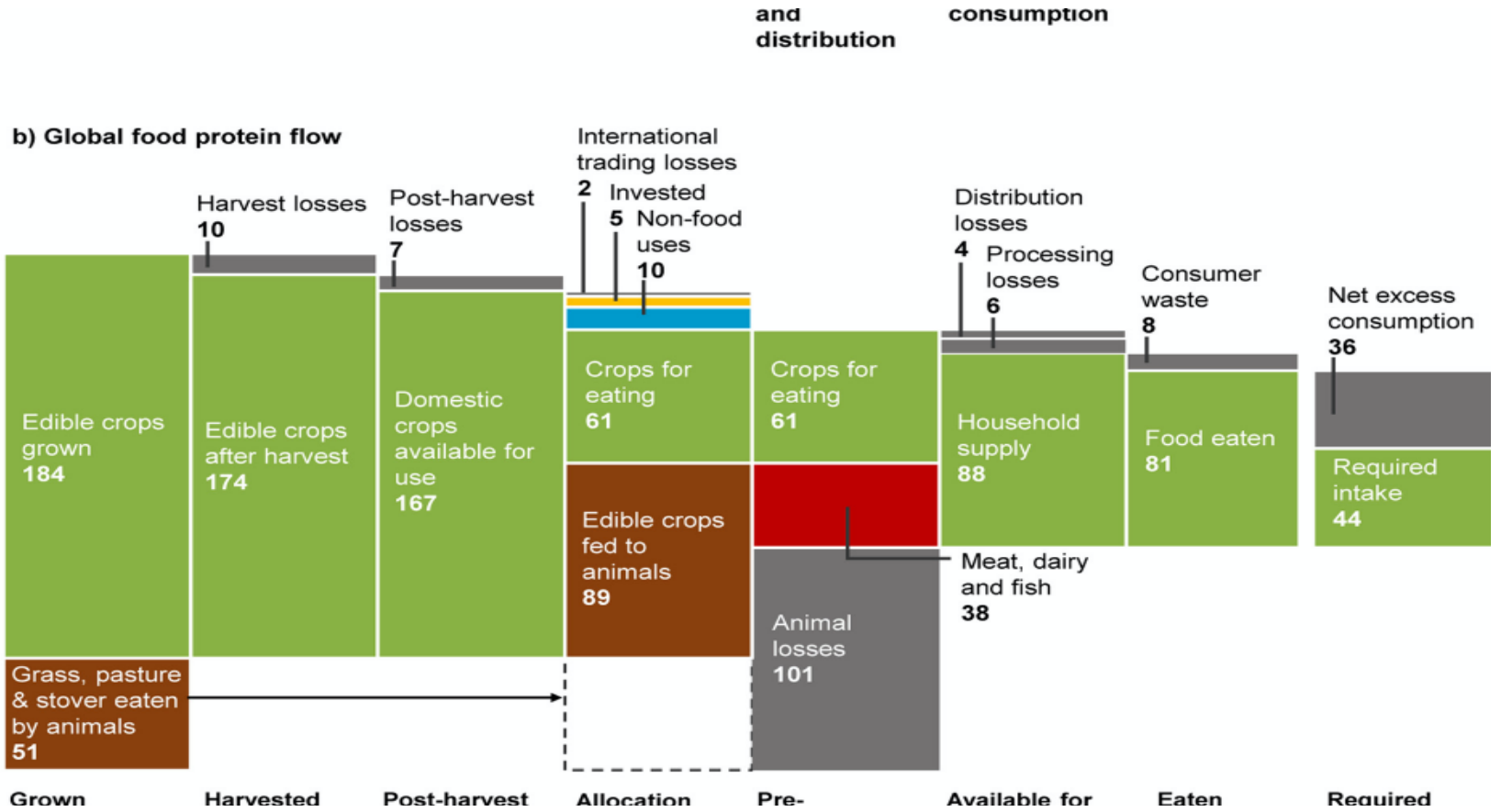
We haven't even mentioned **post-gate losses** and impacts, which would make the advantage of agroecology even greater



POST GATE: NUTRITION

Post-gate food waste in conventional farming: about 40%

This drastically reduces produce per area of conventional farming



Berners-Lee, M, et al. 2018. Current global food production is sufficient to meet human nutritional needs in 2050 provided there is radical societal adaptation. Elem Sci Anth, 6: 52.

RECAP

1. **Motivation:**

   Self-Sufficiency as Ethics

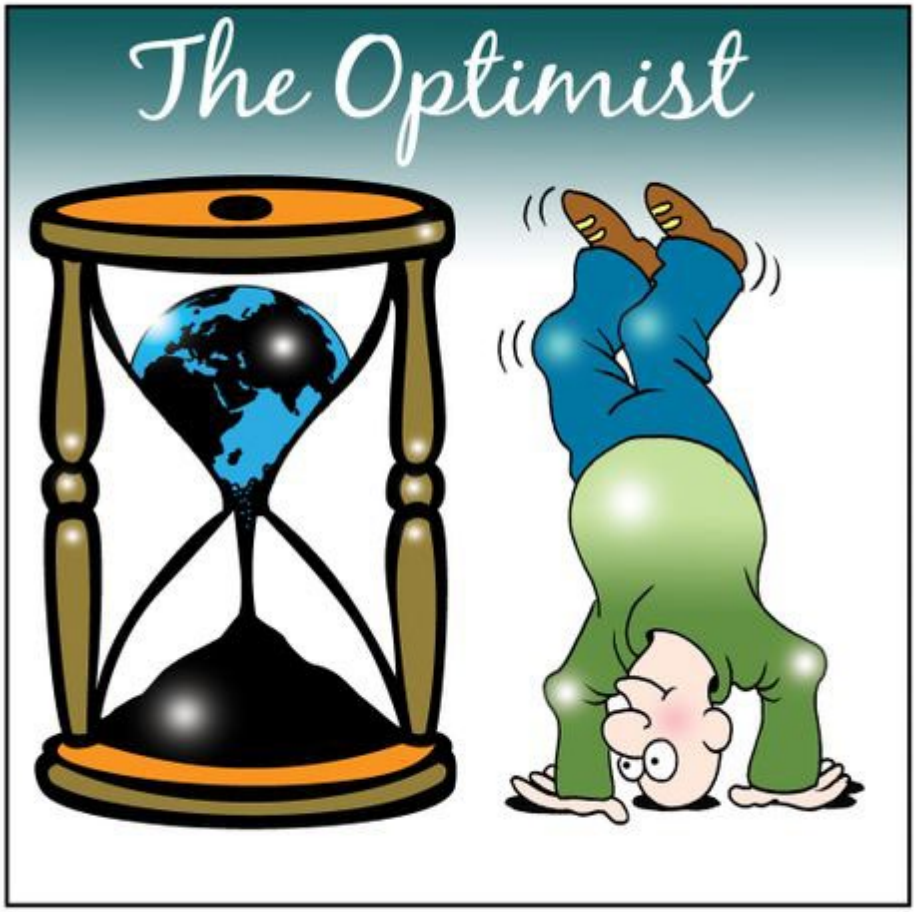
2. **Execution:**

   House; Garden

3. **Results:**

   Nutrition; Environment

4. **Conclusion**



THANK YOU!

Stay in touch:
alikpelman@technion.ac.il

DISCUSSION: UPSCALING

1. copy and paste

2. inflate

DISCUSSION: UPSCALING

What elements of agroecology can be preserved on a large scale?

1. No chemicals
2. No-dig
3. Seasonal
4. Local varieties
5. Crop-rotation
6. Minimum irrigation (80% of plot rainfall)
7. Small-scale tools
8. Zero waste
9. Crops with high nutritional yield (80% of plot: cereals, pulses, oil)
10. Spatial overlap (grain/olive oil)

DISCUSSION: UPSCALING

Finance: is agroecology financially viable?

Need to be checked.

However,

Average monthly income in Israel: NIS 11,000

Average monthly expenses on food: NIS 1000

Hence, 0.1 of employment time is spent on food, i.e., 2.2 days/month

Agroecological farm: 1 day/month + expenses.

Conclusion: AGRO's produce is not more expensive.

DISCUSSION: TOTAL LAND USE

Example: Wheat land occupation

	m2a	%
Total	**3,83**	100%
Crop	3,001	78%
Construction (industrial, dump, traffic)	0,016	0,4%
Natural (forest, grass etc)	0,686	18%
Water (water bodies, rivers, seabed etc)	0,122	3,2%
Mineral extraction	0,001	0,0%