GROW. FEED. EDUCATE

Sustainable farming growing naturally over time
## Presentation

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CONTEXT
Collectivization of agriculture in Europe

“The process through which, by making CHANGES IN THE PROPERTY RIGHTS, changes in social relations between villagers occur, in their self-image and their view on society.”

Poland and Yugoslavia
abandonment of collectivization

Albania, Bulgaria and Romania
full collectivization on the Soviet model

Czechoslovakia, East Germany and Hungary
modified forms of collectives
Collectivization of agriculture in Romania

**PAST**
(before 1948)
Private-owned agricultural land
Subsistence farming

**COLLECTIVE FARMS**
(1949 - 1989)
State-owned agricultural land
organized in collective farms

**PRESENT**
(after 1989)
Private-owned agricultural land,
returned to original owners or sold
CAP Farm typology (Agricultural Cooperative for Production)

Village

“Headquarters” site: barns, sheds, machinery, storage, animals

Agricultural land belonging to the village: agricultural production
Current situation of CAP farms

- Farm sites are abandoned
- Constructions are in (advanced) decay
- Interest and investments in the field of agriculture (Government, EU funding)
- Need for a sustainable redevelopment strategy for integration into modern society
Variable factors on national level

- Economic activity of the area
- Vernacular architecture
- Construction techniques
- Locally available materials
Site location

**LANDSCAPE**
Plain; Altitude: 130-135 m

**SOIL**
Chernozem - very fertile, high agricultural yield

**CLIMATE**
Temperate continental: hot summers, cold winters, 4 very distinct seasons
Average temperature: Summer 22-24°C, Winter -3 - -5°C
Average rainfall: Average 450-600 mm/year
Current situation of the area

**STRENGTHS**
- Largest arable surface on national level
- Good to very good soil quality
- High agricultural potential
- High level of agricultural production
- Proximity to Bucharest

**WEAKNESSES**
- Poor qualification and training of the population in the agricultural field
- Low degree of implementation of modern technologies
- Limited capacity for production, processing and storage
- High education drop-out rate
- High rate of migration
- Loss of identity
- Loss of vernacular crafts and architecture
Current situation on site

Village

“Headquarters” site: barns, sheds, machinery, storage, animals

Agricultural land belonging to the village: agricultural production
Current situation on site
Current situation on site
Current situation on site
Current situation on site
Current situation on site
SUSTAINABLE REDEVELOPMENT
Circular economy in agriculture

Cradle-to-grave: linear process

Resources → Manufacturing → Disposal

Cradle-to-cradle: circular process

Resources → Manufacturing → Use → Recycle
Sustainable redevelopment for a sustainable future
Sustainable redevelopment for a sustainable future

Community

Agriculture

Construction

Site scale

Building scale

Community

Agriculture

Construction

Wider context scale
Social sustainability

HIGH MIX OF FUNCTIONS
New masterplan
- open, in relation to its surroundings
- responds to the needs of the area
- high mix of functions aiming to create interesting experiences and add value to the community

Agricultural education center
Farmer’s house
Entrance & Market
Horse barn
Goats barns
Storage
Cooking workshop
Restaurant
Accommodation
Milking parlour & Dairy production Workshop
Fodder storage
Goats barns
SUSTAINABLE REDEVELOPMENT

Social sustainability
Social sustainability
Social sustainability

EDUCATE

Agricultural education center
Farmer's house
Entrance & Market
Goats barns
Horse barn
Milking parlour & Dairy production Workshop
Storage
Cooking workshop
Restaurant
Accommodation
Goats barns
Fodder storage
Sustainable agriculture & farming

PRINCIPLES OF PERMACULTURE

- A development of agricultural ecosystems intended to be sustainable and self-sufficient

- A consciously designed landscape which mimics the patterns and relationships found in nature

- It involves zoning a land from the most intensively accessed facilities in the middle to the wildest and least maintained ecosystems in the borders
Permaculture in masterplan

Zone 0
The main building
Permaculture in masterplan

Zone 1
The spice garden
Greenhouses
Permaculture in masterplan

Zone 2
Vegetable garden (crop rotation)
Livestock
Ponds
Permaculture in masterplan

Zone 3
Orchard
Perennials
Grains
Pasture
Permaculture in masterplan

Zone 4
Nut trees
Bushes
Timber production
DURABILITY AND ENERGY EFFICIENCY; FROM THE FIRST DESIGN STEPS

**Construction phase**
Embodied energy - all energy consumed by all the processes associated with a building, from the acquisition of natural resources to the final delivery.

**Action**
- Low-embodied energy materials
- Local materials
- Durable construction

![Energy usage of the building sector per phase](chart)

**Operational phase**
Energy consumed by users (ventilation, lighting building services, acoustics, etc.)

**Action**
- Sufficient insulation
- Passive design
- Alternative or renewable energy sources.
“In order to build for a more sustainable future, we must first look back to our past. The potential of using natural and renewable materials, locally sourced, must now be recognized in order to reduce and minimise environmental damage.”
Vernacular architecture S Romania - construction techniques

- Rammed earth/ cob house with thatched roof
- Timber structure, wattle-and-daub walls, shingles roof
### Low-impact building materials

<table>
<thead>
<tr>
<th>a) Biodegradable/renewable materials</th>
<th>b) Locally available</th>
<th>c) Low-embodied energy materials</th>
<th>d) Effectively inexhaustible</th>
</tr>
</thead>
<tbody>
<tr>
<td>Straw</td>
<td>Straw</td>
<td>Straw</td>
<td>Earth</td>
</tr>
<tr>
<td>Wood</td>
<td>Wood</td>
<td>Wood</td>
<td>Rubble</td>
</tr>
<tr>
<td>Sheep wool</td>
<td>Sheep wool</td>
<td>Sheep wool</td>
<td>Lime</td>
</tr>
<tr>
<td>Flax</td>
<td>Flax</td>
<td>Flax</td>
<td></td>
</tr>
<tr>
<td>Cork</td>
<td>Cork</td>
<td>Cork</td>
<td></td>
</tr>
<tr>
<td>Hemp</td>
<td>Hemp</td>
<td>Hemp</td>
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<tr>
<td>Hempcrete</td>
<td>Hempcrete</td>
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</tbody>
</table>
Comparison low impact materials

Insulating materials:
- Timber
- Cork
- Flax
- Straw bales
- Sheepwool
- Hempcrete
- Hemp

Structural/thermal mass materials:
- Rammed earth
- Stone
- Rubble
- Gravel
- Hempcrete
- Timber
Value assessment

I Demolition of old buildings

II Reparation and refurbishment

III Demolition of old buildings and construction of new buildings

Material to be reused

- Brick
- Brick - steel structure
- Brick - timber structure
- Wood - steel structure
- Concrete - timber structure
- Steel structure
- No demolition

C2 C3 C19 C18 C17 C30 C20 C26 C29 C4 C6 C7 C8 C9 C10 C11 C12 C13 C14 C15 C27 C28 F C25 C1 C21 C22 C24
Scenarios for redevelopment - existing buildings
Scenarios for redevelopment - new buildings

<table>
<thead>
<tr>
<th>Construction phase</th>
<th>Operational phase</th>
<th>Maintenance</th>
<th>End-of-life</th>
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<tbody>
<tr>
<td>LOWEST LEVEL OF EMBODIED ENERGY</td>
<td>HIGHEST LEVEL OF THERMAL PERFORMANCE (thermal resistivity + thermal mass)</td>
<td>MOST DURABLE/ LEAST MAINTENANCE</td>
<td>MOST BIODEGRADABLE</td>
</tr>
<tr>
<td>Foundation: Rubble gabions (rubble trench foundation)</td>
<td>Foundation: Rubble gabions (rubble trench foundation)</td>
<td>Foundation: Gravel gabions</td>
<td>Foundation: Rubble (rubble trench foundation)</td>
</tr>
<tr>
<td>Walls: Hempcrete (cast in-situ) + earth plaster</td>
<td>Walls: Earth (rammed) + earth plaster + hemp/ flax insulation</td>
<td>Walls: Hempcrete (cast in-situ) + lime plaster + timber cladding</td>
<td>Walls: Straw (bales) + earth plaster</td>
</tr>
<tr>
<td>Roof: Reed (thatched roof)</td>
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<tr>
<td>Floors: Earth (rammed) + straw insulation</td>
<td>Floors: Earth (rammed) + hemp/ flax insulation</td>
<td>Floors: Timber frame + hemp/ flax insulation</td>
<td>Floors: Timber frame + straw insulation</td>
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INTERRUPTION
Redevelopment timeline

**Phase 1**
Demolition decayed barns  
Irrigation pond  
Hemp/ straw culture  
Zone 4 - timber production

**Phase 2**
Zone 0 - temporary storage  
Harvest culture  
Gather rubble and materials to be reused
Redevelopment timeline

1. PREPARATIONS

2. RENOVATION/REFURBISHMENT

3. MAIN LIVESTOCK

4. CROPS

5. NEW BUILDINGS

6. FINAL PROJECT

7. FUTURE DEVELOPMENT

**FARM**

**TOURISM/EDUCATION**

**Phase 3**
Refurbish barns (cultivated & reused materials)
Introduce livestock - goats
Hemp/straw culture
Redevelopment timeline

**Phase 4**
Zone 1
Intensive agriculture - area around irrigation pond
Greenhouses

**Phase 5**
Zone 2/3
Integrated agriculture (vegetables, orchard, grains)
Redevelopment timeline

| Phase 6 | Entrance/ market building |

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- Sorting grains
- Sorting people

- Phase 6
- Entrance/ market building
Redevelopment timeline

Phase 7
Restaurant/ cooking workshop building

Phase 8--
Agricultural education center
Possible future growth
Grow. Feed. Educate. In one building.

Workshops cluster

Middle of agricultural crops
Grow. Feed. Educate. In one building.
Building programme
Archetype of barn - architectural expression

- Pitched roof
- Small, rhythmic openings on long facade
- Main access on short facade
- Linearity
Archetype of barn - architectural expression
Archetype of barn - circulation

1. Farmers: Entrance - Storage - Fields

2. Clients: Entrance - Restaurant - Terras

3. Workshop visitors: Entrance - Fields - Storage - Workshop - Restaurant - Terras
Archetype of barn - circulation

Typical barn circulation

Zoning of masterplan

Interpretation
Archetype of barn - circulation
Archetype of barn - circulation

First floor 1:200
Archetype of barn - circulation

First floor 1:200
Archetype of barn - interior

- Visible Structure
- Rhythm
- Linearity
- Open Floor Plan
- Viewlines
Vernacular architecture - Evolution of dwellings (S Romania)

The hut (dug in the ground)
- Cob, wattle-and-daub, reed, timber planks and beams, wool

The archaic house (one room only)
- Timber construction, cob, shingles/reed

The archaic house (two rooms, separate entrances)
- Timber construction, cob, shingles/reed

The elongated passage house (two/three rooms + barn, shed)
- Cob, timber, plaster

The half-raised house (about 1m above ground, storage downstairs)
- Cob, timber, plaster

The two-storeyed house (two levels, storage downstairs)
- Cob, timber, plaster

The two-storeyed house (two/three rooms + barn, shed)
- Cob, timber, plaster

The patio house
- Cob, timber, plaster

The boyar house (one room only)
- Cob, timber, plaster

The traditional house (central plan, 2/3 storeys, multiple rooms)
- Cob, timber, plaster

The passage house (two/three rooms)
- Cob, timber, plaster

The archaic house (one room only)
- Cob, timber, plaster

The passage house (two/three rooms)
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The half-raised house (about 1m above ground, storage downstairs)
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The traditional house (central plan, 2/3 storeys, multiple rooms)
- Cob, timber, plaster
Reinterpretation of vernacular

The hut

The elongated passage house

The half-raised house

The merchandiser house

AA' Section
Reinterpretation of vernacular

BB' Section

CC' Section

DD' Section

BB' Section

CC' Section

DD' Section
Framing the views
Framing the views
Framing the views
Orientation

South facade
Orientation

West facade

East facade
Orientation

North facade
Passive building principles

- High level of uninterrupted, all-round insulation
- Airtight design and indoor air quality
- Heat gain from winter sun (solar gain - thermal mass)
- Shading against summer sun
- Compact building design

*Diagram showing summer and winter sun positions and heat distribution.*
Climate design

Temperate climate

- protection against solar irradiation (summer)
- use of solar gains and protection against heat loss (winter)
- use of storage mass

MVHR (Mechanical ventilation with heat recovery from exhaust air)

Summer: mixed mode ventilation strategy
- Natural ventilation (night time)
- MVHR on air-to-air ground heat exchanger (over 25°C)

Winter: MVHR - incoming air pre-heated by extracted air
Materialisation with low-impact materials

Low-impact materials and low embodied energy (at least 50% savings)
No evaporation of volatile chemicals
Absorb volatile organic compounds
Absorb/ de-absorb moisture
Regulate indoor air humidity
High insulation value
(U value: 0.15-0.20)

Thatched roof, hemp insulation, plywood sheathing, lime plaster
Local oak - timber structure

Hempcrete wall, thatched wall

Hempcrete floor, lime mortar, natural stone finishing

Hempcrete wall, exterior timber cladding
Materialisation layers

- Thatched roof
- Exterior timber cladding
- Hempcrete walls
- Oak load-bearing structure