



ON-FARM CLIMATE RESILIENCE ACADEMY: VISEGRAD 4 ARMENIA

Գյուղացիական տնտեսություններում կլիմայի փոփոխության դիմակայման ակադեմիա.  
Վիշեգրադը հանուն Հայաստանի

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# Compendium

Supported by *International Visegrad Fund*

Implemented by *Združenie mladých farmárov na Slovensku – ASYF*

In partnership with *Společnost mladých agrárníků České republiky, Development Policy Foundation, Hungarian Permaculture Association and Organic Armenia*



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## I. Problem identification

Climate change is a highly concerning topic of our days. Agriculture has a major role (24% - <http://www.fao.org/3/a-i6340e.pdf>) in greenhouse gas (GHG) emission. These greenhouse gases' global warming potential (GWP) is calculated in CO<sub>2</sub> equivalent, according to what methane (CH<sub>4</sub>) has 20, and NO<sub>2</sub> 300 times stronger GWP than CO<sub>2</sub> ([https://www.researchgate.net/publication/28684793\\_Organic\\_Farming\\_and\\_Climate\\_Change](https://www.researchgate.net/publication/28684793_Organic_Farming_and_Climate_Change)).

**GHG emission of agriculture is coming from different sources (Fig. 1).**

### 1. N<sub>2</sub>O

- High soluble N level in the soil with spreading of manure or chemical fertilisers on fields to nourish the crops
- Animal housing and manure management separated from crop production is handling farmyard manure as a waste thus producing N surplus that serves as pollutant
- Denitrification is additionally enhanced in compacted soils

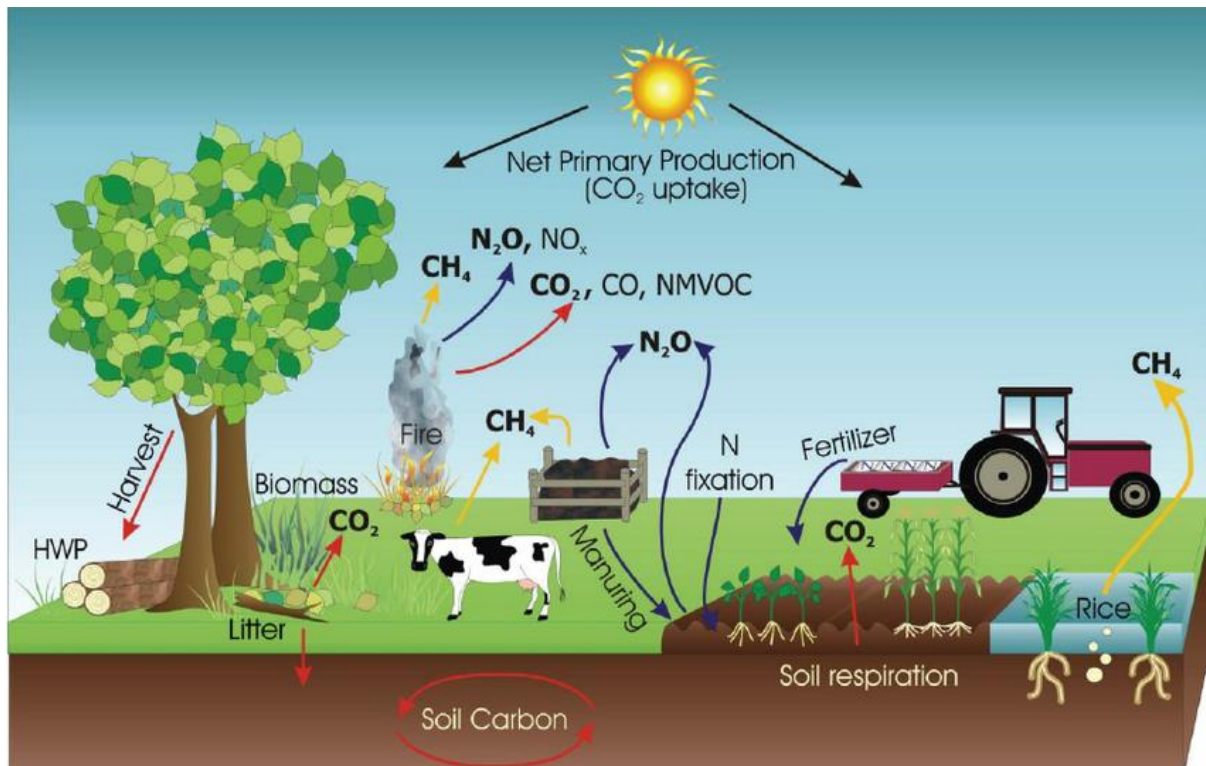


Fig. 1: The main greenhouse gas emission sources, removals and processes in managed ecosystems. Source: Intergovernmental Panel on Climate Change, (2006). "IPCC Guidelines for National Greenhouse Gas Inventories", prepared by the National Greenhouse Gas Inventories Programme, Eggleston H.S., Buendia L., Miwa K., Ngara T. and Tanabe K. (eds). (IGES: Japan, 2006), 16. (<https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html>)



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## 2. CH<sub>4</sub>

- Enteric fermentation: methane is emitted as a by-product of the normal livestock digestive process, in which microbes resident in the animal's digestive system ferment the feed consumed by the animal (Niggli et al. 2008).
- On rice paddies continuous flooding with anaerobic decomposition of organic material could result in high methane emissions
- In manure handling the same anaerobic circumstances during maturing of farmyard manure causes higher methane emission. A shift from anaerobic to aerobic storage of manure can reduce methane emissions, but will increase emissions of nitrous oxide by a factor of 10
- Biomass burning releases CH<sub>4</sub> in high amount
- Compacted soil with anaerobic decomposition also a big factor in CH<sub>4</sub> emission

## 3. CO<sub>2</sub>

- IPCC considers flux of carbon dioxide (CO<sub>2</sub>) both to and from the atmosphere is nearly balanced in agriculture, and represents less than 1% of global anthropogenic CO<sub>2</sub> emissions.

## II. Solutions

Various opportunities exist for mitigation and adaptation in agriculture. Many agricultural practices which are beneficial for mitigation also have positive contributions for water, soil and biodiversity protection, as well as for adaptation.

Connection possibilities to climate change for the proposals -  
every small step counts

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## 1. Water retention

When the greenhouse is on a light slope we can use wood chips in a ditch between the crop rows to soak up surficial irrigation water and release it slowly



**Fig. 2:** Wood chipper and a good use of wood chips in a greenhouse for water retention  
(Source: [lowtechinstitute.org](https://www.youtube.com/watch?v=X0H7X_7p8LM), [https://www.youtube.com/watch?v=X0H7X\\_7p8LM](https://www.youtube.com/watch?v=X0H7X_7p8LM) from 14:57)

## 2. Optimising Water Usage

- a. Rainwater catchment systems could enable us to be more independent from municipal water systems that is especially important during dry periods. There are many solutions with advantages and disadvantages.  
<https://lowtechinstitute.org/2019/08/28/rainwater-catchment-systems-from-contributor-eric-mcglynn/>
- b. Collected rainwater could be used even as drinking water or other household purposes with Pluvalor System (Fig.3.)



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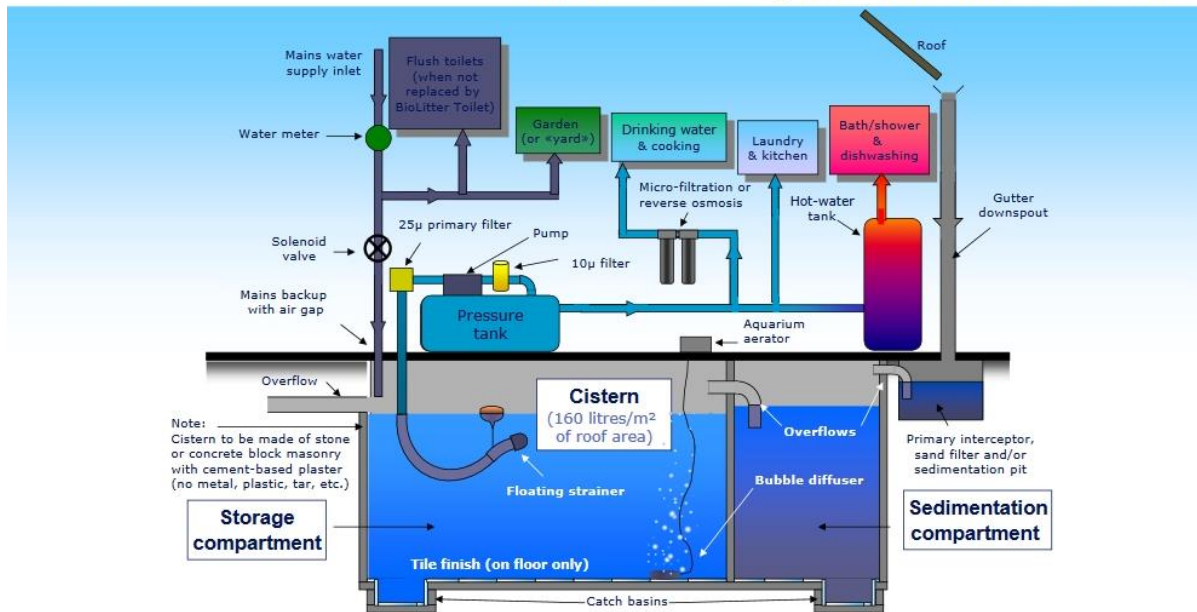


Fig. 3: Pluvalor System. Details from: <http://www.eautarcie.org/en/index.html>, [https://www.youtube.com/watch?time\\_continue=236&v=637cdB5x9ss&feature=emb\\_title](https://www.youtube.com/watch?time_continue=236&v=637cdB5x9ss&feature=emb_title)

### c. DIY drip irrigation system with timer

Water is pumped from a well (or rainwater tank) controlled by a timer. System is built with LPE hoses, and water tanks from where water is spread by gravitation into the drip irrigation hoses (Fig. 4.).



Fig. 4. DIY irrigation system. Pictures and system building by Király Kornélia

### 3. Decreasing fossil fuel usage for gaining energy

- a. Egg collector conveyor belt driven by manpower in mobile hen housing system (Fig. 5.).



**Fig. 5.** Conveyor belt in a mobile hen house to collect eggs.

Source: Chicken Caravane 450 <https://www.youtube.com/watch?t=40&v=ECVzhOC5Q0>

- b. In small scale farming, usage of effective mechanical tools without fossil fuel usage (Fig. 6., 7., 8., 9.) They can be homemade also: <https://lowtechinstitute.org/2017/03/09/diy-project-making-a-broadfork-from-contributor-matt-miles/> or <https://www.youtube.com/watch?v=woHNgHkbWzA>)



**Fig. 6:** Seeding machine



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**Fig. 7:** Broad fork for loosening beds



**Fig. 8:** Planter machine



**Fig. 9:** Effective weeding tools



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- c. A solar dryer can be a low energy food processing method (Fig. 10.).  
<http://tautai.com/do-it-yourself-8-homemade-solar-food-dehydrators/>



**Fig. 10:** Solar dryer

- d. Storing food in a homestead or even wrapping goods to sell can have environmentally friendly solutions as well excluding plastic (Fig.11).



**Fig. 11:** Bees wrap.

<https://lowtechinstitute.org/2018/09/04/new-video-no-14-bees-wraps/>

In case of using wax paper for wrapping one should be sure to use the ones made with soybean wax or zein, a protein from corn.

<https://www.backyarddigs.com/compost/is-wax-paper-compostable/>

- e. Greenhouse production is associated with high energy consumption, especially in winter. The use of fossil fuels is the main contributor to global warming. A walipini, an in-ground greenhouse could spare the entire winter heating need (Fig.12.). A design plan is available here:  
<https://lowtechinstitute.org/2017/11/07/walipini-earthbag-greenhouse-design/>



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Fig. 12: Walipini

#### 4. Stopping erosion, increasing soil coverage

The possibility to maintain higher CO<sub>2</sub> concentrations in the soil is the key for sustainable soil management.

Decrease soil disturbance, cover the soil as much as you can. In small scale no-dig vegetable beds are good solutions with coverage on the roads like straw and woodchips (fig.13.). It's good against soil compaction and weeds, always ensuring organic matter. It can be also a total soil coverage (fig.14.)



Fig. 13: Covered roads in gardens



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**Fig. 14:** Total soil cover in garden bed system

## 5. Decreasing artificial fertilizer usage

- a. Using compost as fertiliser is giving out not only nutrients, but living organisms, which can develop soil quality in the long-term. For having good compost ingredients a compost shredder can be a good tool (Fig. 15.).



**Fig. 15:** Garden compost shredder

- b. There are some low energy composting methods. For example: Johnson-Su bioreactor is a static composting method which doesn't need turning, and the result is a very good quality compost (Fig. 16.) : <https://bit.ly/2EGu95l>



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Fig. 16. Johnson-Su bioreactor

## 6. Reduce intensive animal husbandry

- a. DIY chicken coop could be built in 8 hours with the help of for example the following design. <https://lowtechinstitute.org/2016/12/21/low-tech-design-simple-coop/>
- b. It could be connected with compost making: <https://drive.google.com/file/d/0Bx5pz3PA-3kidWF6R2JKZ1NwY2s/view> to which you can ask permission to see clicking action plan link here: <https://abundantpermaculture.com/i-cut-my-chicken-feed-bill-100/>



Fig. 17. Poultry



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- c. Solar panel based electric fencing could help to establish and maintain intensive rotational grazing (Fig. 18.) that is based on constant renewal of grazing grass binding more CO<sub>2</sub> from the air meanwhile not using electricity gained from fossil fuels or from central power plants.



**Fig. 18:** Intensive rotational grazing

(<https://transterraform.com/permaculture-strategies-intensive-rotational-grazing/>)



**Fig. 19:** Solar electric fence charger

## 7. Community solutions

Purchasing a machine and lending it to our community members will spare big amount of energy and raw material consumption with preventing the production of new and new machinery or tools. Example: <https://lowtechinstitute.org/tool-library/>



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