LANDENERGYBIODIVERSITY

ELEMENTARY TECHNOLOGIES–
BIG BENEFITS

gef SGP The GEF Small Grants Programme UNDP Uzbekistan

www.sgp.uz www.uz.undp.org

This publication was compiled by GEF Small Grants Programme (GEF SGP), with the support of UNDP in Uzbekistan. It includes infographics on innovative technologies in sustainable agriculture, which impact both economic and environmental outcomes.

Our current projects are presented using advanced techniques in information design to explain principles of operation for these technologies and to demonstrate the advantages and benefits of applying these state-of-the art solutions compared with traditional approaches and practices. This collection of infographics includes technologies such as -zero tillage; establishment of varietal pistachio plantations; laser land leveling; isolation of irrigation canals; micro hydro power plants; biogas technologies; intensive aquaculture; drip irrigation and others.

We hope that this publication will be useful for the farming and peasant communities of Uzbekistan, as well as for a wide range of stakeholders to include employees of Water User Associations, professionals and employees of regional divisions of the Ministry of Agriculture and Water Resource Management, regional forestry staff, experts of regional Committees for Nature Protection, teachers and students of agricultural universities and institutes of national economy, and academicians.

Partners:

NGO'KRASS'
Institute of Microbiology, Academy of Sciences of the Republic of Uzbekistan
Republican Scientific and Production Center of Ornamental Horticulture and Forestry
Tashkent Institute of Irrigation and Melioration
UNDP/GEF project 'Promoting energy efficiency in public buildings'

Any views of opinions presented in this publication are solely those of the authors and do not necessarily represent those of the GEF SGP and UNDP in Uzbekistan.

The e-version of the publication is available on the website: www.sgp.uz

LANDENERGYBIODIVERSITY

ELEMENTARY TECHNOLOGIES–
BIG BENEFITS

gef

SGP The GEF Small Grants Programme

UNDP Uzbekistan

www.sgp.uz www.uz.undp.org

During the period of privatized former state property and original accumulation of capital, funding for both novel and proven technologies aimed at habitat conservation and safer natural resources extraction was constrained. While the merit in reducing biodiversity loss is supported and considered necessary; perceived utility of making investments in these alternative and renewable technologies, as compared with other income-generating avenues such as business enterprise, continues to be a point in question. The GEF Small Grants Programme supports leading-edge solutions to alternative and renewable energy challenges. The Programme search for people who are driven to innovate approaches aimed at the honorable cause of habitat and biodiversity conservation. This work reduces pressure on ecosystems through the strategic implementation of progressive technologies. Our future priorities are to focus on the efficacy of these projects put simply is making sure they work!

Bakhtiyor Kamilov, the head of the intensive Aquaculture project.

Alternative energy sources and resource-saving technologies make it possible to heat houses, buildings, and greenhouses more efficiently and are also used for rational resource extraction in agriculture. Yet, many of these technologies are not applied or rarely applied in practice. While the reasons for this are not entirely know, one possible explanation is lack of knowledge or concerns over the costs associated with project implementation. Thanks to joint efforts in the Khorezm region, a project on energy effective greenhouses was launched, which trains local residents on high-yielding vegetable provision for the winter period. We designed a biogas power plant that provides clean household heating and high-performance bio-fertilizers. GEF SGP in partnership with KRASS also pioneered land laser leveling technology in Khorezm. Since that time, land laser leveling has become one of the leading innovations today within Uzbekistan. The implementation of these new technologies is possible with minimum energy and economic investments and will improve quality of life for Uzbek citizens.

NGO «KRASS»
Khorezm region

The studies of Uzbekistan floral biodiversity have more than 150 years history. During this period, noted advancements were made in the study of agro-diversity as evidenced in countless articles, scientific reports, and field journals. Uzbekistan currently holds the most substantive and detailed data source on herbarium plant specimens, which is located in the pool of the Central Herbarium of the Institute of the Gena pool of plants and animals of the AS RUz. This unique botanical collection boasts more than 1,5 millions of herbarium plant specimen sheets, collected since 1840 in all the regions of Uzbekistan and in Middle Asia. Since 2013, the Institute of the Gena pool of plants and animals of the AS RUz with the support of GEF Small Grants Programme implemented the project, whose goal is the development of Uzbekistan flora electronic database. It is our hope that this database will be viewed as a source of invaluable information on sustainable extraction techniques for the conservation of floral biodiversity. We are certain this resource will make profound contribution to the sphere of ecological education and ecotourism.

Komiljon Tojiboyev and Natalia Beshko,
The Institute of the Gena pool of plants and animals AS RUz

“Thanks to GEF SGP, we were able to install and operate a biogas power plant. At the beginning of the project, few believed that this technology would work. However the GEF SGP team supported our undertaking and provided assistance to us during every phase of the project. Today our power plant has been successfully operational for nearly three years. During that time, there have been commendable improvements to household infrastructure and livestock conditions. We measured a 30 percent increase in the number of domestic pigs with no loss of young animals during the winter period. As a direct result of derivable bio-fertilizers, fodder crops productivity increased by 25-30 percent. We are elated with the project results and are grateful to GEF SGP for their valued support”.

Farm "Nadejda (Hope)"
Sirdarya Region

Since 2008, GEF SGP has actively collaborated with the scientists of the Republican Scientific and Production Center of Ornamental Horticulture and Forestry to engineer solutions to challenges in scaling-up pistachio commercial crops in Uzbekistan. Due to the characteristics of exceptional drought tolerance and high adaptability, this species is the most promising in relation to the rainfed drylands cultivation, particularly in areas with a shortage of irrigation water where other species cannot thrive without irrigation. Pistachio cultivation in such territories improves the ecological stability in the adjacent areas, and above all, converts these degraded lands (previously used for grain-crops and grazing) into lands suitable for agriculture. Pistachio cultivation is of great significance to the economy, and this sector of agriculture is very promising for the country as well as for the population that inhabits the rainfed dryland foothills. Pistacia vera is an invaluable nut-bearing species that can become an important strategic crop in Uzbekistan.

Collective of scientists of the Republican Scientific and Production Center of Ornamental Horticulture and Forestry

GEF Small Grants Programme supported the initiative on beekeeping development in the Parkent district of the Tashkent Region. The joint project has provided residents of the district and surrounding mountain villages with beekeeping education. An observation of bees and their pollinating ability conducted during the project suggests a tremendous connection between bees' life activities and crop productivity. For example, the crop yields of one clover increased by 53percent. Bee cultivation led to the production of an additional two tons of cucumbers from 0.5 hectare of the experimental field in comparison with the control group. One can argue with confidence that the more bees there will be, the greater crop yield farmers will harvest. Beekeeping is an illustrative way of demonstrating the economic importance of environmental services, and safeguards food and economic security in Uzbekistan.

Marsel Minzafarov – beekeeper from Parkent district in Tashkent region

GEF Small Grants Programme works to promote the application of innovative technologies in Uzbekistan. A joint partnership with the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan (AS RUz) is supporting construction on a low-tonnage greenhouse complex. A new biological product, SERHOSIL, is engineered from green microalgae of Scenedesmus genus and is currently being tested successfully in several districts. The lead institutes of MAWR RUz are overseeing the application of SERHOSIL in Uzbekistan districts and preliminary data suggests notable improvements in the ecological condition of soils; increased fertility; in crop productivity and in crop quality; and hardiness and drought resistance of all kind of crops. SERHOSIL can significantly reduce the cost of fertilizers and irrigation water, increase plants immunity and reduce their disease incidence.

Djumanyazova Gulnara and the team SERHOSIL

“In my role as a local drip irrigation system producer, I partnered with GEF SGP on a project to install a production line for drip irrigation systems adapted to the conditions of Uzbekistan. Currently, we are working on production and installation of irrigation systems, equipment installation and training farmers on how to use this technology.
Drip irrigation reduces water use by an astounding 2000% compared with traditional irrigation techniques-reducing the litres of water required from 900-1000 m^3 to a mere 46-48 m^3. Mineral fertilizers are served with water in the dissolved form, thus watering time is reduced. Our goal is to deliver affordable products and services to farmers. Using this framework, I install the system at no cost on 1 hectare for each farm that implements the drip irrigation system. Scale-up of this project in the near future will require the construction of a micro hydroelectric power station to meet the needs of the drip irrigation system's fabrication shop”.

Abdulvokhid Boltaboyev, Drip Irrigation System Producer in Namangan region

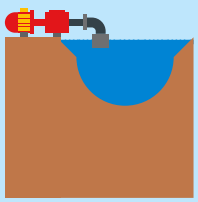
PLASTIC ISOLATION OF CANALS

Isolation of irrigation canals with polyethylene film for reduction of water infiltration loss is 2 times cheaper than other isolation technologies.

Problems of interfarms and intrafarms canals

More than 50%

of water is lost, on the way to farmer, due to the infiltration into the soil. Infiltration causes to secondary soil salinization. Water shortage and soil salinization result in losses of crop yield and profit.



Electric water pump usage

high energy consumption of water pumps (for watering [purposes]) results in high production cost. Interruptions in electric supply lead to uneven watering, decrease in quality and quantity of crop yield.

Economic effectiveness of plastic isolation of 1 km of canal with perimeter of 5 meters

32,2 mln

cost of 1 km of canal, *soums*

49% 89%

Canal efficiency before and after canal isolation

200 476

area of the irrigated lands before and after plastic isolation, *ha*

4 mln m³

annual water savings after the implementation of isolation

0,15

increase in crop yield of raw cotton due to the better water supply, *tons/ha*

7,5 mln

profit from additional crop yield, *soums*

90 ths

annual savings on electricity consumption due to the non-use of water pumps, *kW/h*

9,4 mln

Reduction of electricity costs, *soums*

20,1 mln

Reduction of water supply costs, *soums*

On the level of farms

16,9 mln

Total profit of canal isolation
=
reduction of electricity costs
+
profit from the additional crop yield, *soums*

1,9 Payback period, *years*

On the level of Water Users Association

37,0 mln

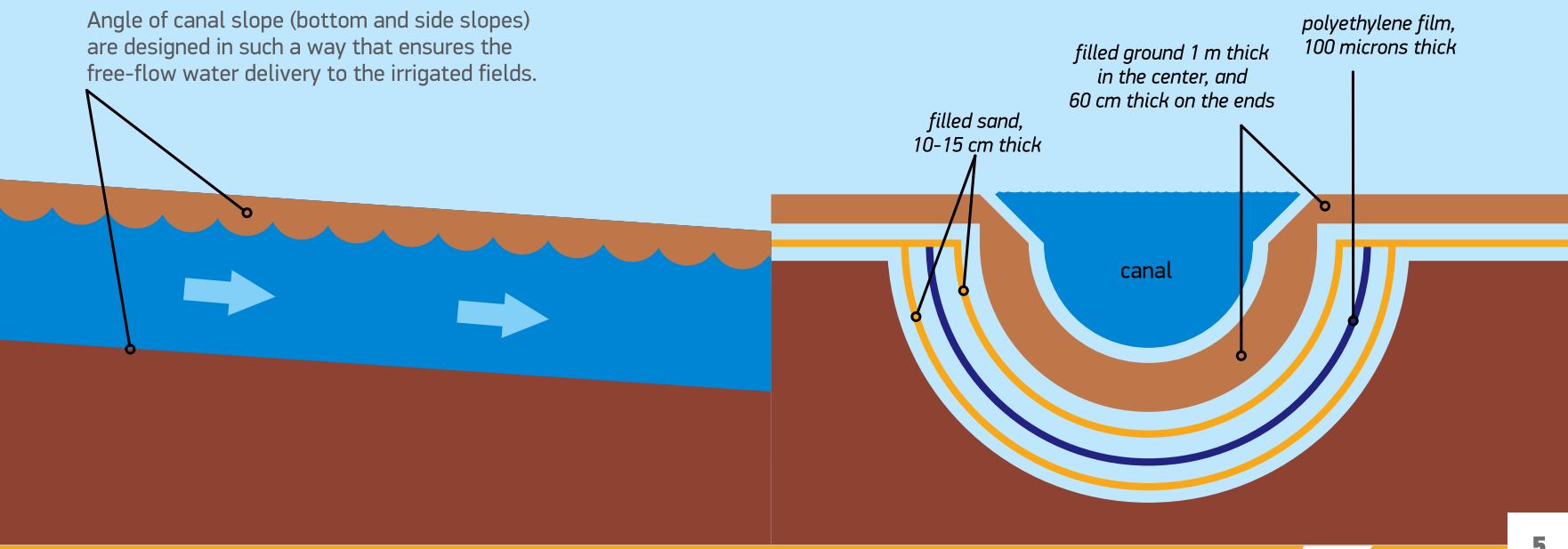
Total profit of canal isolation
=
reduction of water supply costs
+
reduction of electricity costs
+
profit from additional crop yield, soums

4,8 mln Net income in the first year, *soums*

0,9 Payback period, *years*

Structure of a canal with plastic bottom isolation

Angle of canal slope (bottom and side slopes) are designed in such a way that ensures the free-flow water delivery to the irrigated fields.



On techonology of canal isolation, please contact Ms. Inna Rudenko:
mobile tel.: +998 93 754 77 90
e-mail: irudenko@mail.ru
kkrass@ymail.com

www.sgp.uz www.uz.undp.org

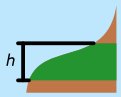
PISTACHIO PLANTATIONS IN UZBEKISTAN

Central Asia is home to pistachios which can grow without irrigation.

Establishing a wide variety of pistachio plantations is an economically profitable and environmentally justified alternative to existing land use practices.

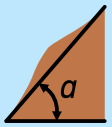
Selection of a place for establishment of pistachio plantations

In Uzbekistan it is profitable to establish commercial pistachio plantations in the dry foothills

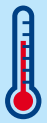


in the range of from
600-1300 m
above sea level

with an average precipitation
> 300-350 mm



land areas with a slope steepness equal to ≤ 30 °



with an annual sum of positive temperatures
≥ 3 500°C

Development benefits of cultivating pistachios in Uzbekistan

Creation of economically favorable conditions for development of pistachio agriculture.

Long-term lease of foothill land - 49 years with a right for renewal.

Tax "holidays" for the land before the first crop.

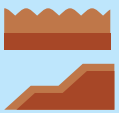
Access to a preferential mini-loans.

Establishment of a network of consulting centres with pistachio demo-plantations and uterine plantations of a variety of pistachio

Agricultural methods for the establishment of pistachio plantations

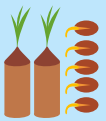
Enclose the territory with wire fences, trenched with a parapet or a clay wall.

Separate the territory into units based on landform and area aspect.

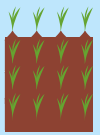


Depending on steepness, prepare the soil through solid ploughing, strip plowing or with an on-plow and cross and bulk terraces.

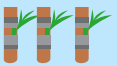
Mark the planted areas in the allotments.



Establish plantations by seeding methods that concentrate in a specific place or by planting seedlings with a closed root system and grown in small containers.



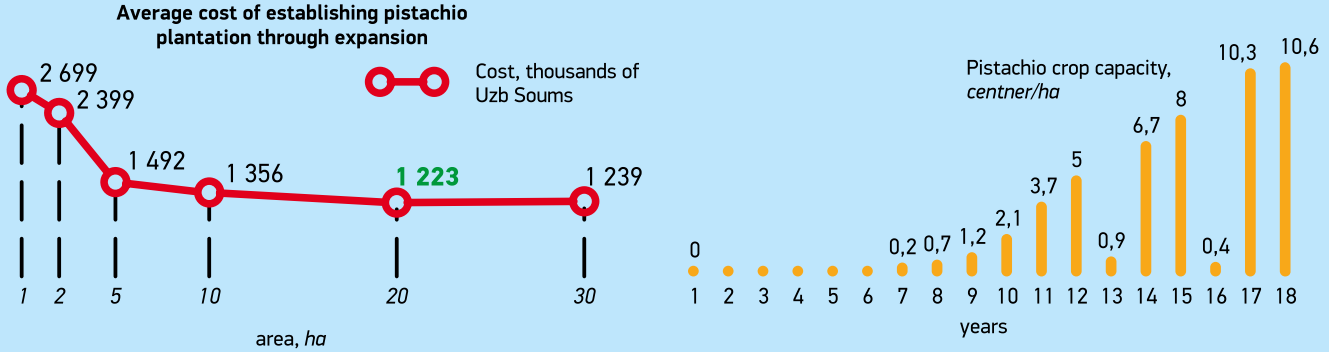
Add and upkeep young plants before inoculation; planting agricultural crops in between.



Inoculate young pistachio plants.

Form a tree crown, while up keeping old vegetation.

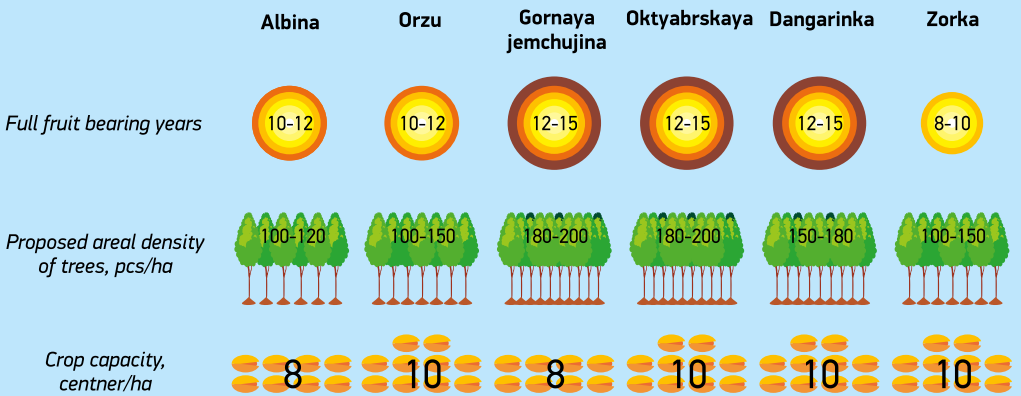
Economic Indicators Favorable for Cultivating Pistachios



Cost-efficiency of cultivating pistachio in comparison to other crops and sheep,
*mln of Uzb soums per 1 ha**

* *The data presented was collected over a period of 18 years, starting when pistachios began to yield. 20% percent inflation is assumed, as is a density of 5 sheep per 1 ha*

Pistachios are a promising crop for the economic and international advancement of the Republic of Uzbekistan. The various strains available for cultivation are listed.



Please direct enquiries regarding the establishment of pistachio plantations to Mr. Evgeniy Botman:
mobile tel.: +998 90 174 53 85
e-mail: darhanbek@yandex.com
and Mr. Lyutsian Nikolyai:
mobile tel.: +998 94 631 93 17
e-mail: 77lucian77@mail.ru

gef SGP The GEF Small Grants Programme UNDP Uzbekistan
www.sgp.uz www.uz.undp.org

FIELD-PROTECTIVE BELTS

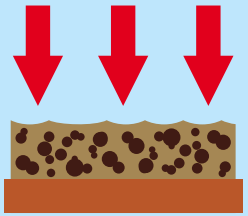
Field-protective belts consist of several rows of trees and bushes that protect fields from wind erosion and improve fields' microclimate.

Field-protective belts abate the wind velocity in the space between strips, i.e. in the protected fields.

Abatement of the wind velocity influences all other microclimate parameters of the area, such as air humidity, the temperature of air and soil.

65%

of all irrigated lands in Uzbekistan are exposed to wind erosion



humus content in the soil is decreased to

30–50%

Main issues of saving the land capacity

Wind erosion

is one of the main factors for loss of both the topsoil and land capacity

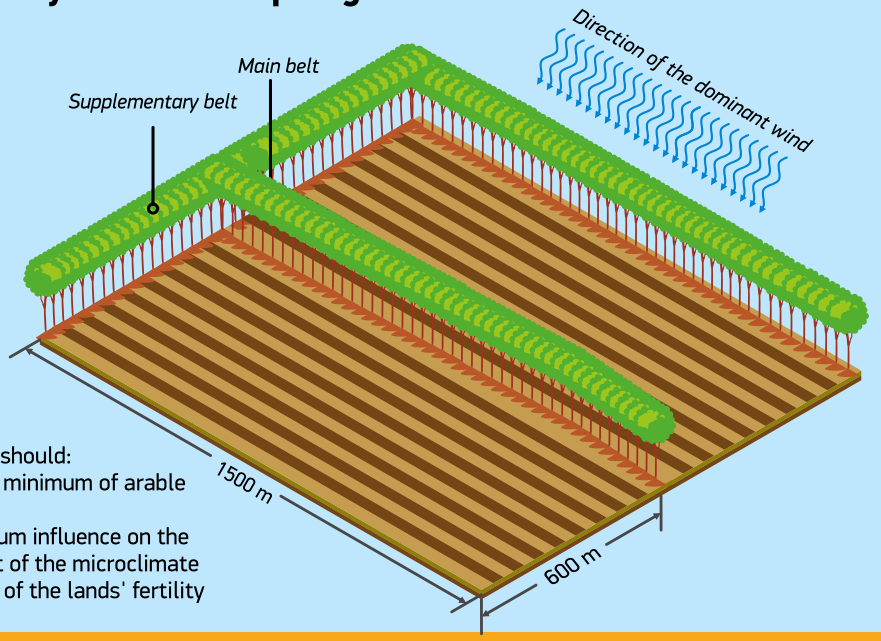
Aridization

of the soil and the surface air brings changes in the structure and removal of the topsoil

Loss of the crop

Summer wind with low air humidity and high temperature leads to loss of the crop

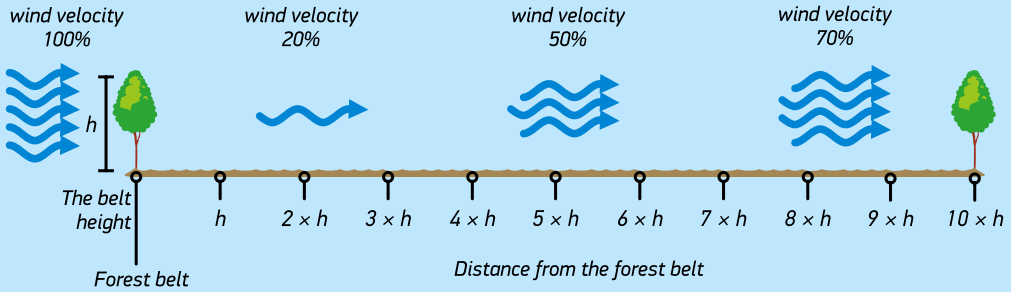
Structure of the field-protective belt system on the plough land

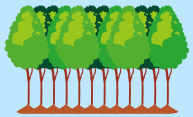


Forest belts should:
- Occupy the minimum of arable land
- Has maximum influence on the improvement of the microclimate and increase of the lands' fertility



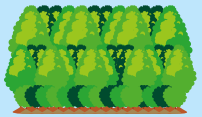

Distance of effect and construction of field-protective belts



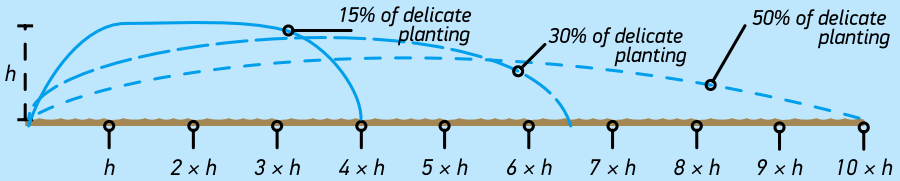


permeable belt

open shelter belt (combined planting of high trees and bushes)



Dense shelter belt (combined planting of high, short trees and bushes)

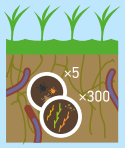


crop yield and quality of the crop is increased by 15-20%

Decrease of the wind velocity halts the loss of the topsoil

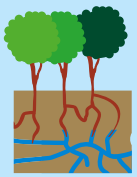
Advantages of the forest belts on irrigated and dry lands and benefits from the belts to nature

Wind velocity is decreased for 34-38% and humidity of the surface air is increased up to 5-9%



Increase of biodiversity and landscape capacity contribute to growth of the soil microfauna

Up to 1 degree C the air temperature is decreased in summer and the soil temperature falls up to 1.2 degree C



Lowering the groundwater level leads to decline of resalinization

For questions regarding the establishment of field-protective belts, please contact Mr. Evgeniy Botman:
mobile tel.: +998 90 174 53 85
e-mail: darhanbek@yandex.com

www.sgp.uz www.uz.undp.org

BEEKEEPING IN UZBEKISTAN

Bees one way to guarantee of food security in the country.

As Einstein said, "As soon as the bees disappear from the surface of the globe, people will follow them within four years".

The main contribution of bees to food security for people is not honey, but their ability to pollinate plants. Without these pollinators, most of the plants would not be able to produce any crops. Due to pollination, the crop can double, or even triple.

Outputs of one hive per year

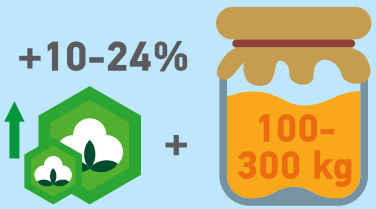
Number of flowers visited
More than 1 bln

The amount of honey from one hive
More than 10 kg

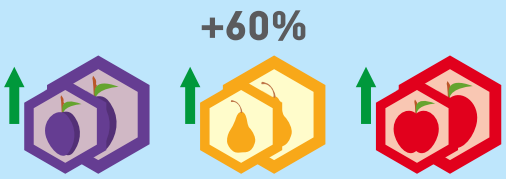
Gathered pollen
20–25 kg

Gathered nectar
200 kg

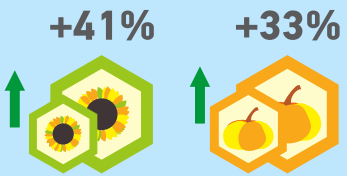
The minimal increase of the crop yield when a bee apiary is minimum placed near the field



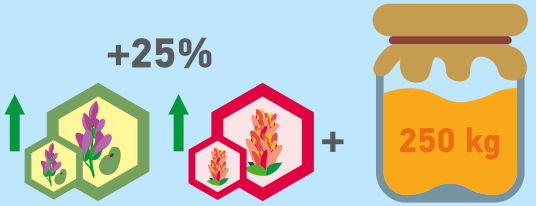
Raw cotton + Honey from 1 ha



Fruit trees and shrubs



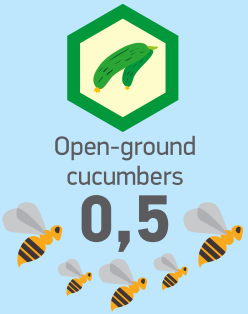
Sunflower Watermelons

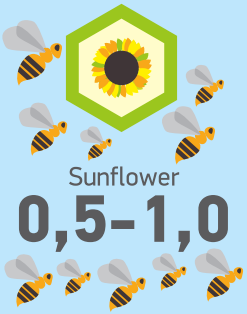


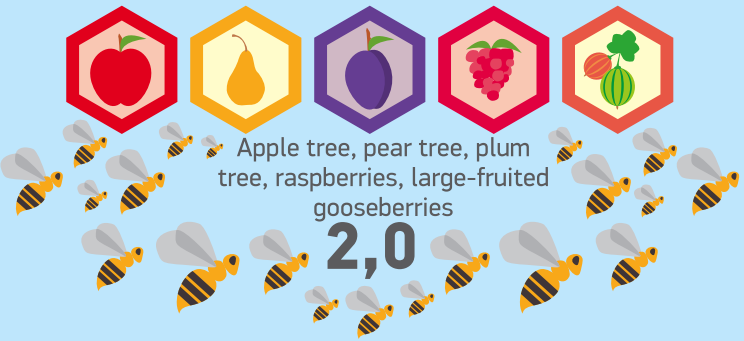
Lucerne and clover + Honey from 1 ha

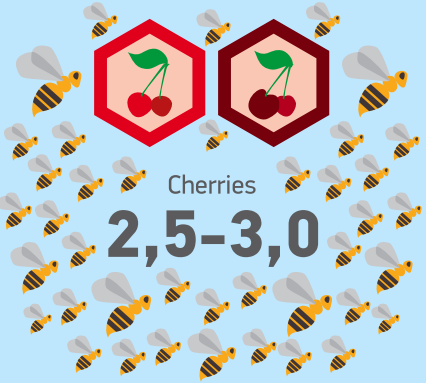



The required quantity of bee hives for pollination of agricultural crops
(per 1 ha)









For more details regarding beekeeping, please contact Mr. Marsel Minzafarov:
mobile tel.: +998 94 644 04 08
e-mail: minzafarov.marsel@yandex.com

www.sgp.uz www.uz.undp.org

FOUR-FIELD CROP ROTATION

Crop rotation is a scientifically approved [practice of] crop rotation and if needed of vapor rotation in time and in allocation to fields.

The suggested [practice of] crop rotation allows to rotate crop sequentially over 4 years, and allows to increase the crop yield by 3 times.

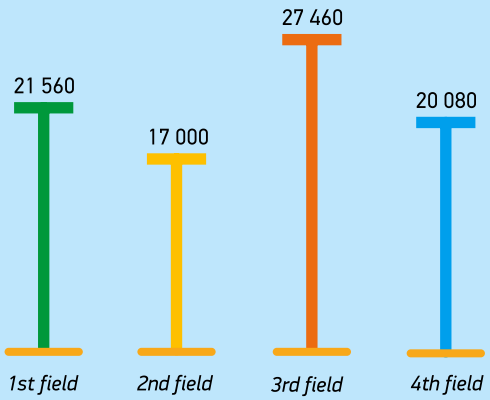
Advantages of four-field crop rotation

Preservation, restoration and improvement of soil fertility; and its protection from erosion in the future

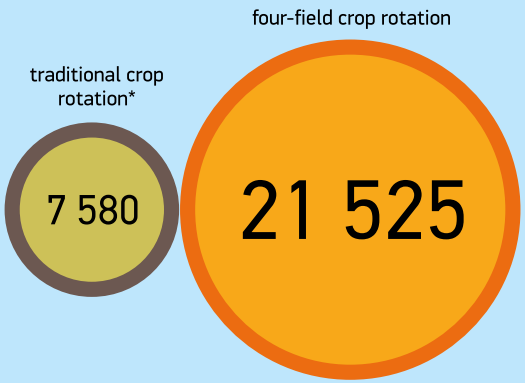
Increase in crop productivity from 1 ha of the irrigated [field] for the production of the fodder, necessary for animal husbandry

Reduction of the production cost of fodder due to many factors

Key performance indicators of four-field crop rotation



Quantity of crop units from 1 ha under the four-field crop rotation



Average crop productivity under the traditional four field crop rotation from 1 ha (in crop units)

**Traditional crop rotation - is [a practice of] crop rotation on the field, when correct soil tillage and soil fertilizers are applied to achieve improvement of soil fertility and crop yield*




Chart on four-filed crop rotation of short rotation

1st year

Winter crop for grains + mulching

Maize for grains

Intermediary cultures (triticale + vetch) for green mass

2nd year

Fodder beet for fodder roots and green mass

Intermediary cultures (triticale + vetch) for green mass

3rd year

Sweet sorghum + maize for green fodder and silo

Early ripening soya beans for grains

Intermediary cultures (oat + vetch + field pea) for green mass

4th year

Maize for grains

Beans and cereals mix for green mass

Fodder beet

On practices of four-field crop rotation implementation, please contact Mr. Nasriddin Khalilov:
mobile tel.: +998 91 529 76 20
e-mail: xalilov_07@mail.ru

www.sgp.uz www.uz.undp.org

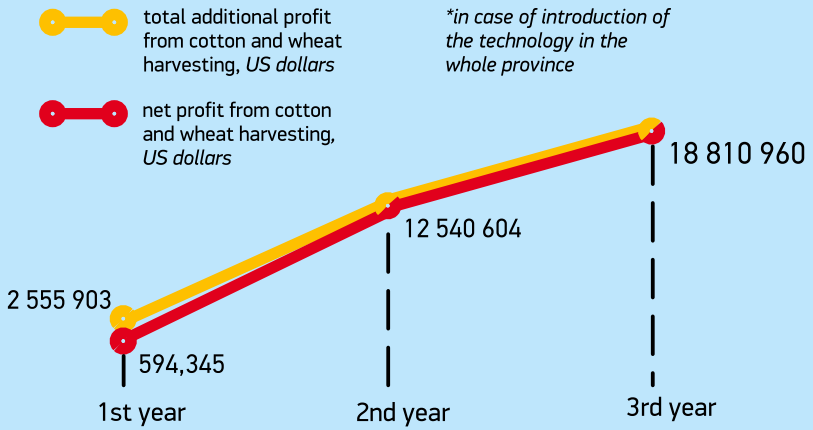
LAND LASER LEVELLING IN UZBEKISTAN

Land laser levelling (LLL) is a method of land levelling with the use of the system for automated control of the height of an operating device, where the final difference of roughness on the surface is ±3 cm or less.

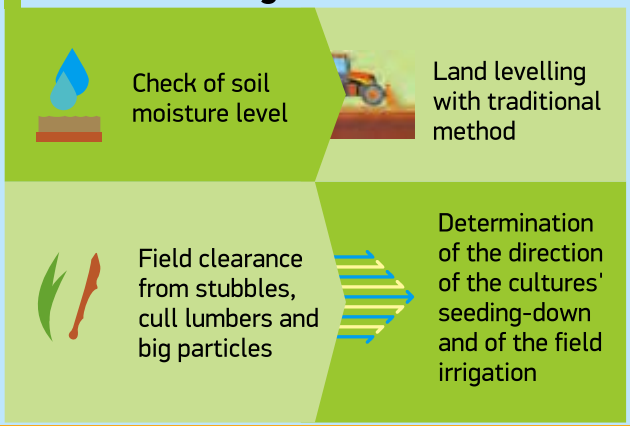
Laser levelling technology is widely used in construction of houses, highways and also in levelling of agricultural lands, trenching of irrigated canals, drainage and collector systems.

Provinces in Uzbekistan where LLL is implemented

An aggregated profit in case of the introduction of LLL technology in Khorezm province*

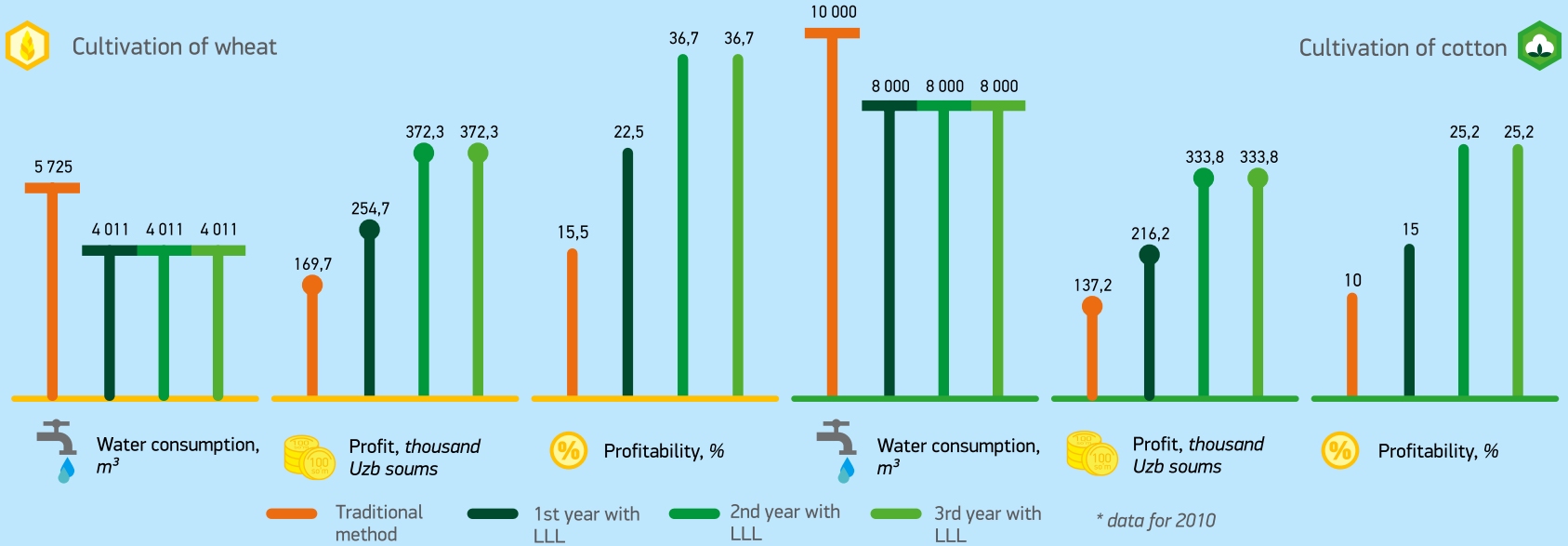


Procedures of land preparation for laser levelling

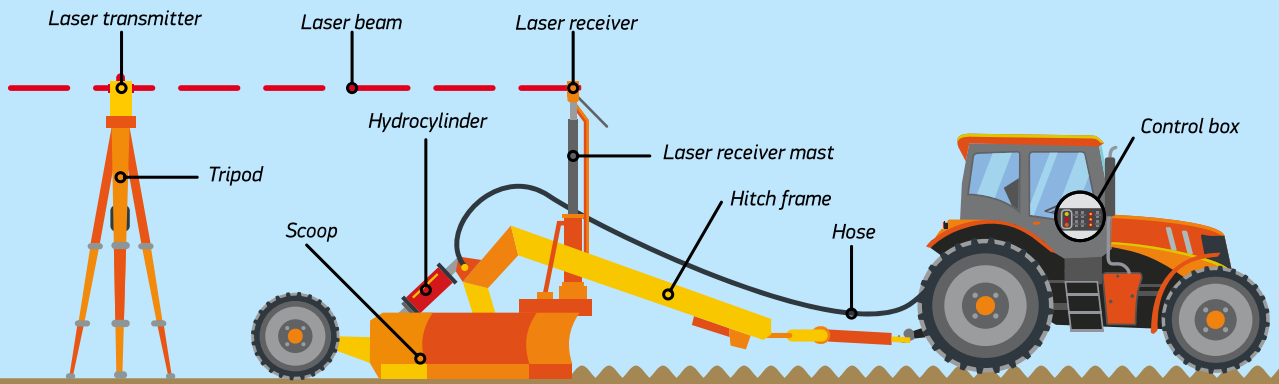





Comparative analysis of traditional method of levelling versus LLL technology in Wheat and Cotton Cultivation (for 1 ha)*



A general overview of the unit for LLL



For questions on land laser levelling technology, please contact Mr. Oybek Egamberdiev:
mobile tel.: +998 91 571 72 39
e-mail: kkrass@ymail.com
oybek_72@yahoo.com

gef SGP The GEF Small Grants Programme UNDP Uzbekistan
www.sgp.uz www.uz.undp.org

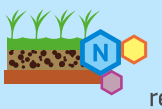
PHYTOMELIORATION IN UZBEKISTAN

Phytomelioration refers to a number of measures designed to restore productive functions to soil and thus prevent land degradation. It primarily uses crop rotation, field-protective belts, flap and planting and forest shelter belts.

Tradition crop rotation for crops such as cotton and wheat demands the introduction of leguminous herbs.

This involves:
• Combined planting of annual lucerne under cover of winter wheat;
• Intermediate planting of legume cereal mixture (Triticale and winter-resistant peas) in the space between rows when the rotation area is not occupied by the primary crop.

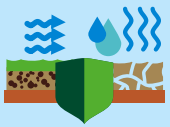
Advantages of phytomelioration



Soil-enrichment with organic matter and nitrogen replenishment up to 100 kg/ha

Increased productivity of irrigated hectares, increased production of the fodder

Restoration of the soil and land reclamation



Protection from the wind and water erosion, protection from excessive moisture evaporation and salinization

Indicators of phytomelioration effectiveness

The average harvest from the fields with conventional technology, c/ha

The average yield of the fields with phytomelioration, c/ha

753 m³/ha

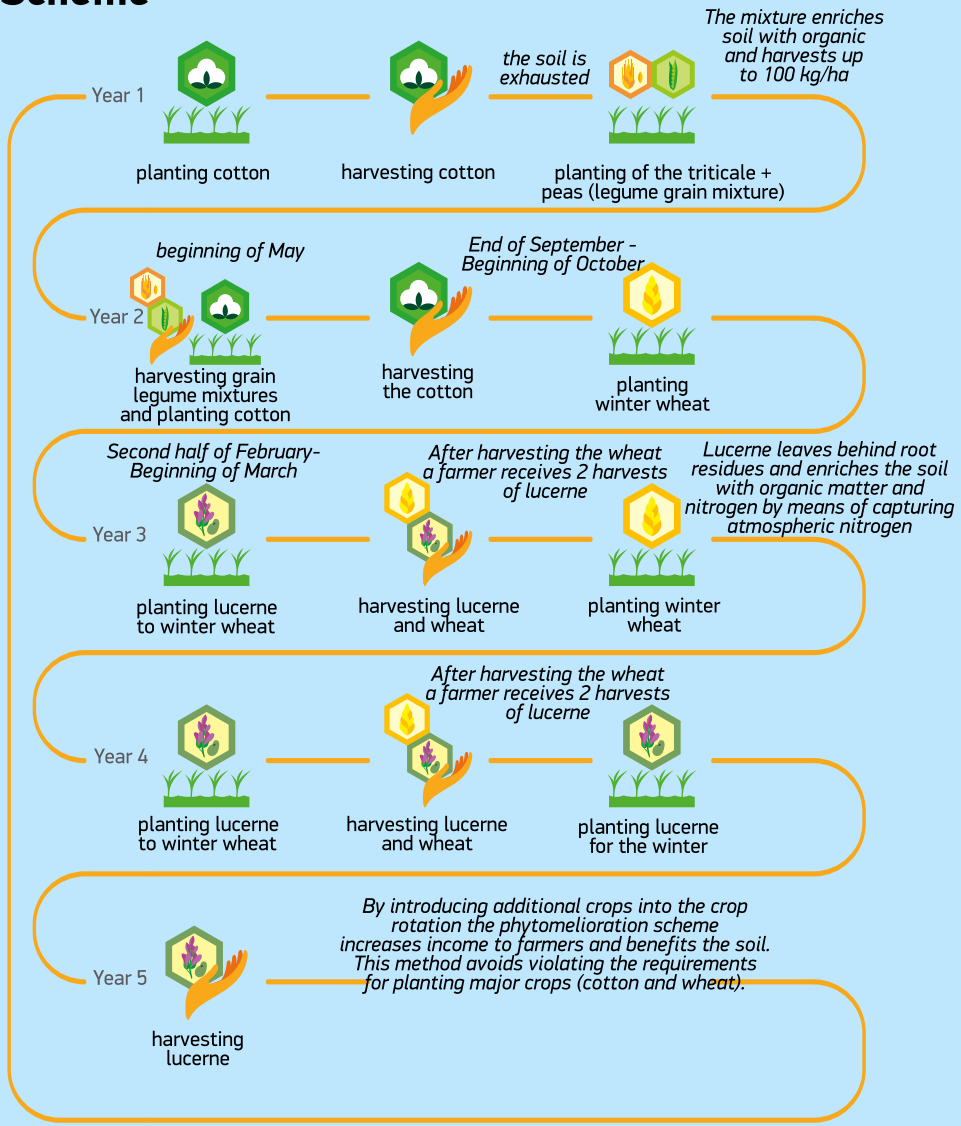
Water saved through completely covering the soil with vegetation thus reducing soil moisture evaporation.

831 974 Uzb soums/ha

Average earning per two plots of land

Profits are 1.4-4 times higher per ha in comparison to traditional methods of cultivation

Phytomelioration Scheme



For questions on phytomelioration technology, please contact Ms. Lyudmila Shurova:
mobile tel.: +998 90 950 08 15
e-mail: lydmila.shurova@mail.ru

www.sgp.uz www.uz.undp.org

INTENSIVE AQUACULTURE

Intensive aquaculture is breeding, incubation of aquatic organisms such as fish and others in natural conditions or in artificial ponds. Growth of the fish is fully maintained due to provided feed.

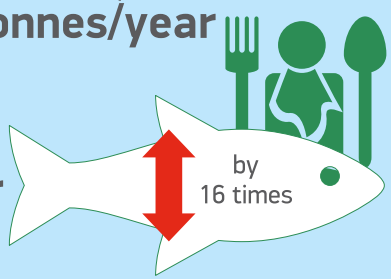
Fish breeding in Uzbekistan equals to 30k tonnes/year*

Up to 2009 the consumption of fish in the country was around **0.4 kg/person/year**

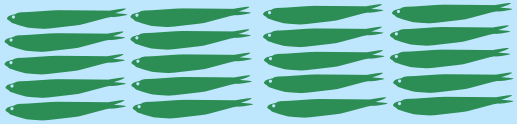
Due to introduction of the intensive aquaculture technology, the consumption has increased and currently equals to **1 kg/person/year**

It should be increased up to **400k tonnes/year**

which equals to the required rate of consumption for assuring the adequate nutrition equaling to **16 kg/person/year**



Currently, low intensity pond aquaculture produces an average of **0.1 to 0.2 kg/m³/year** of fish

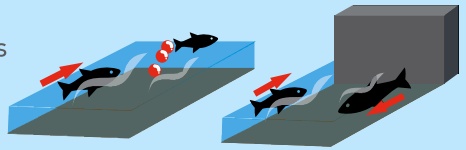


however, there are alternative technologies with productivity equaling to **20-40 kg/m³**

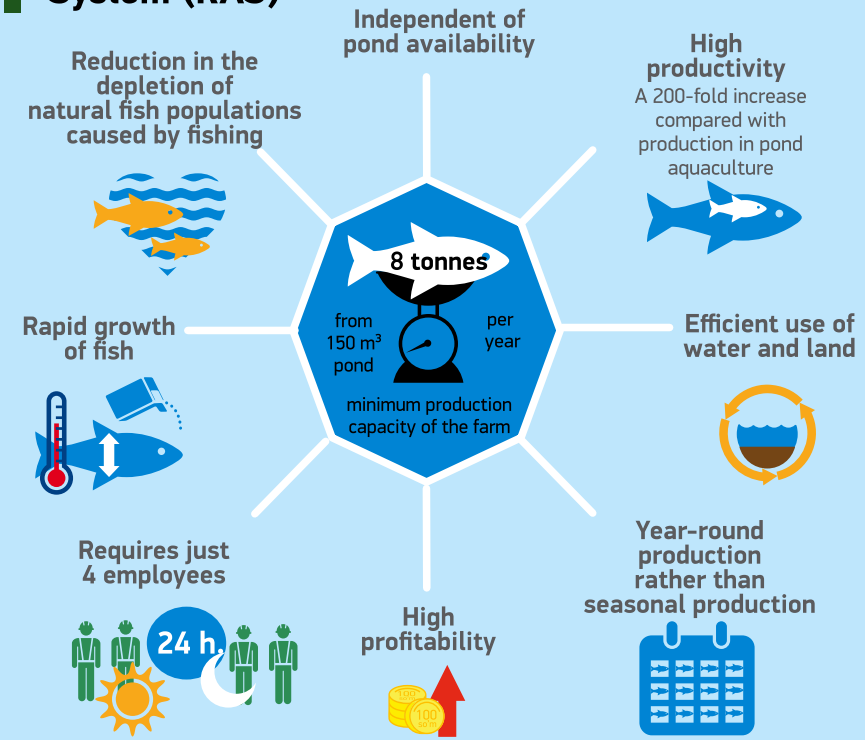
*According to data provided by specialists from Scientific and Experimental Station on Fish Breeding in Uzbekistan

The main reason for fish stock reduction is Over-regulation of rivers

Over-regulation of rivers conflicts with a biological cycle of natural reproduction of fish.



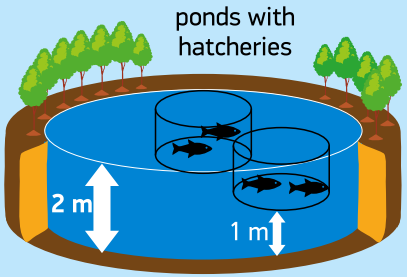
Advantages of a Recirculating Aquaculture System (RAS)



Intensive aquaculture versus conventional pond aquaculture

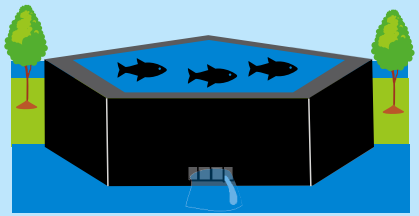
Fish breeding hatchery

in the existing ponds larger than 0.5 ha with a depth of not less than 2 m. The technology requires the use of added feed. The productivity is around 100-200 kg/m³/year



Flowing-water pools

near rivers, canals and other ponds in sloped landscapes, gravity can be used to move water through flowing-water pools

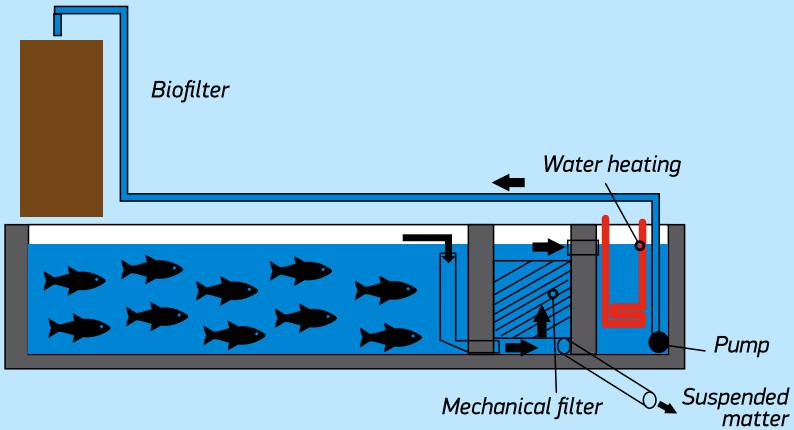


Recirculating aquaculture system (RAS)

In RAS, an artificial pond is equipped with a water circulation system, filtration and heating. Water is recirculated in a closed cycle.

The RAS can be built anywhere a guaranteed power supply exists, and is not limited by pond availability.

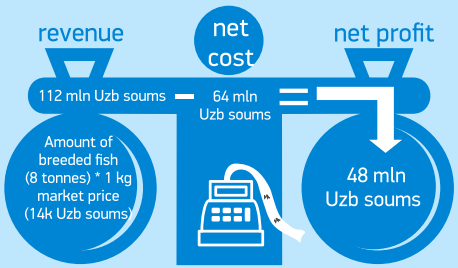
Diagram of a recirculating aquaculture system



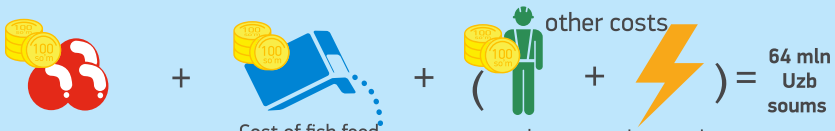
Costs and benefits of RAS

net cost of 1 kg of carp = **8 000 Uzb soums**

Market price of 1 kg of carp = **14 000 Uzb soums**



Revenue, net cost and net profit for a RAS producing 8 tonnes of fish per year in and area of 150 m³, the minimum area required to guarantee profitability and return on investment within 3 years.



Cost of fish eggs **12 mln Uzb soums**

Cost of fish feed (70% of the cost of production) 12k kg, feed coefficient of 1.5 **40 mln Uzb soums**

employee salaries

heat and electricity

*For further detail about intensive aquaculture, visit our website: www.sgp.uz where technical manuals and financial calculations are provided.

For questions regarding intensive aquaculture technologies, please contact Mr. Ibragim Khalilov:
mobile tel.: +998 90 906 65 66
Mr. Bakhtiyar Kamilov:
mobile tel.: +998 93 396 12 69
e-mail: bkam58@rambler.ru

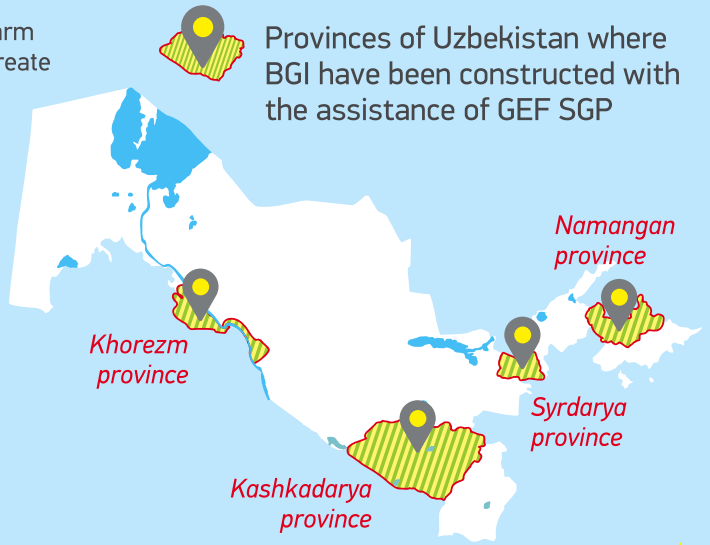
www.sgp.uz www.uz.undp.org

BIOGAS INSTALLATION (BGI)

Biogas installation: a facility that uses on-farm animal wastes and other organic wastes to create biogas and biofertilizers.

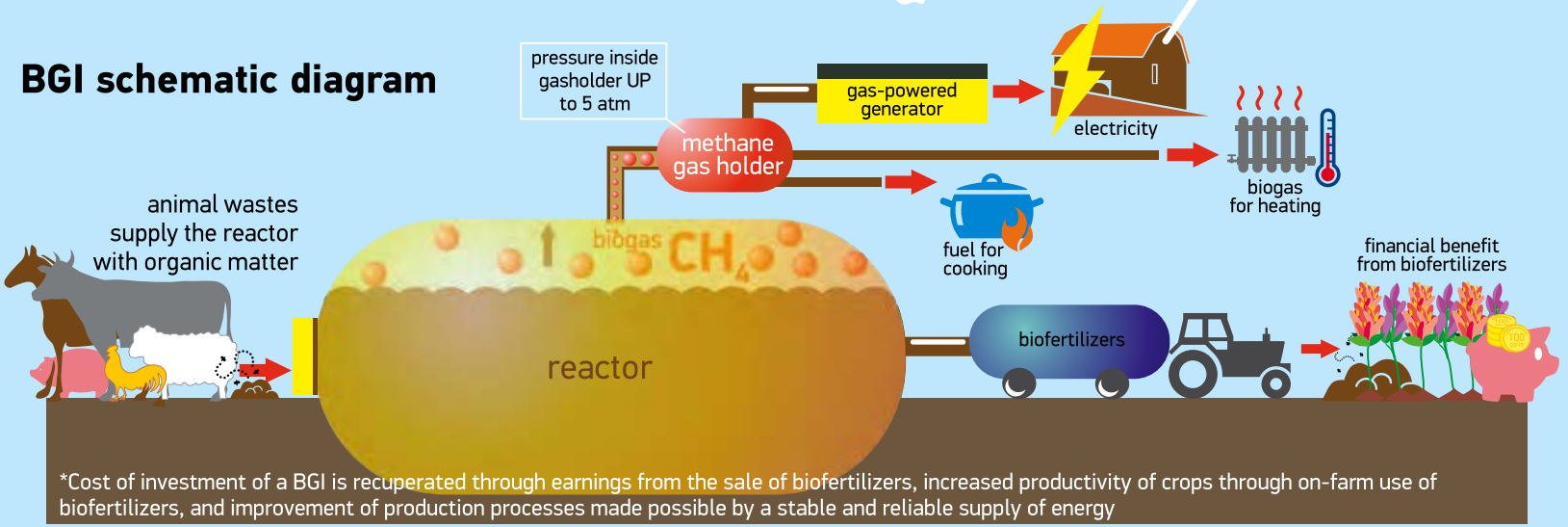
Potential areas for BGI construction with GEF SGP assistance:

Navoi
Bukhara
Samarkand
Republic of Karakalpakstan
Surkhandarya
Jizzakh
Fergana
Andijan



1 m^3 of biogas can be converted to 2 kW*h of electric power or 4 kW*h of heat

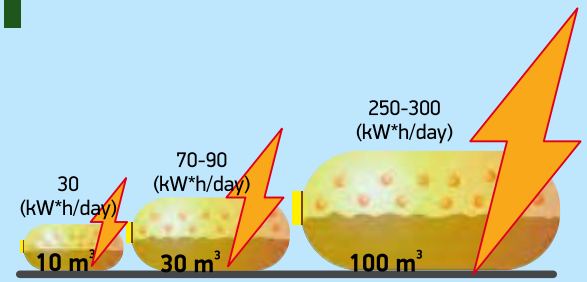
BGI schematic diagram



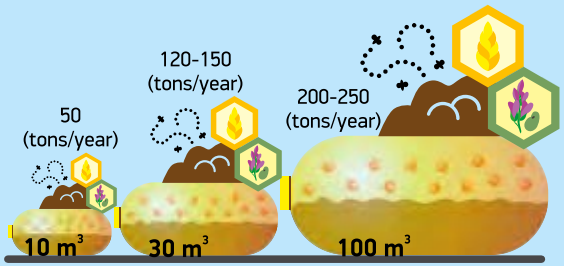
*Cost of investment of a BGI is recuperated through earnings from the sale of biofertilizers, increased productivity of crops through on-farm use of biofertilizers, and improvement of production processes made possible by a stable and reliable supply of energy



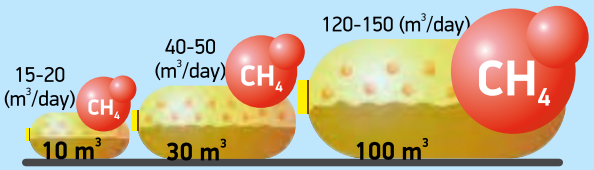

Production from reactors of different sizes



amount of produced electricity

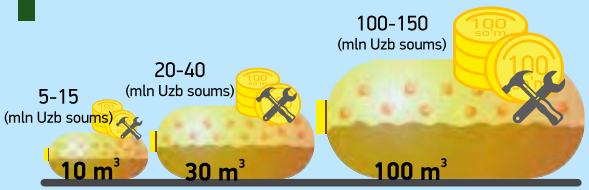


amount of produced biofertilizer

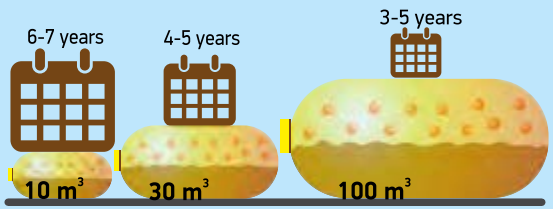


biogas output

Construction costs



construction costs



beginning of payback period*

BGI is a good alternative for:

- waste management on livestock farms
- production of heat
- provision of energy for households
- production of high-quality organic fertilizers (biofertilizers)
- production of electricity

Benefits of BGI

- receiving a stable and independent energy supply for production needs
- a stable revenue stream from the sale of biofertilizers
- reduced synthetic fertilizer use, with attendant reduction in costs of production and increase in environmental sustainability
- reduction in methane emissions from livestock wastes contributes to climate change mitigation
- increased crop production through on-farm use of biofertilizers due to use of produced fertilizers for personal needs
- reduction in water contamination through improved manure management practice
- conservation of woody biomass and forest by replacing wood fuel with biogas
- enterprise flexibility in planning, and risk mitigation, through a guaranteed supply of energy independent of the central energy grid

More detailed information about BGI is available at:
www.sgp.uz and www.leds.uz
For questions regarding BGI, please contact:
Ms. Irina Dergacheva: mobile tel.: +998 90 358 37 39; e-mail: dergacheva_iv@mail.ru
Mr. Pulat Salikhov: mobile tel.: +998 98 128 46 26; e-mail: pulatboy@mail.ru
GEF Small Grants Programme in Uzbekistan:
tel.: + 998 71 120 34 50 (additional 145)
+ 998 71 120 34 62
mobile tel.: + 998 93 381 00 82
e-mail: alexey.volkov@undp.org

www.sgp.uz www.uz.undp.org

INFORMATION PORTAL FOR FARMERS AND DEKHKAN HOUSEHOLDS

What the portal is needed for

for establishing [business] contacts between producers and partners, and suppliers; and for exchange of information

for a wide access to sustainable and efficient agricultural technologies

information support for solving problems of agricultural producers

Web portal users and visitors

Farms

Entrepreneurs, sales representatives

Bulk buyers

Insurance companies

International agricultural products buyers and importers

Logistics companies

Research centers

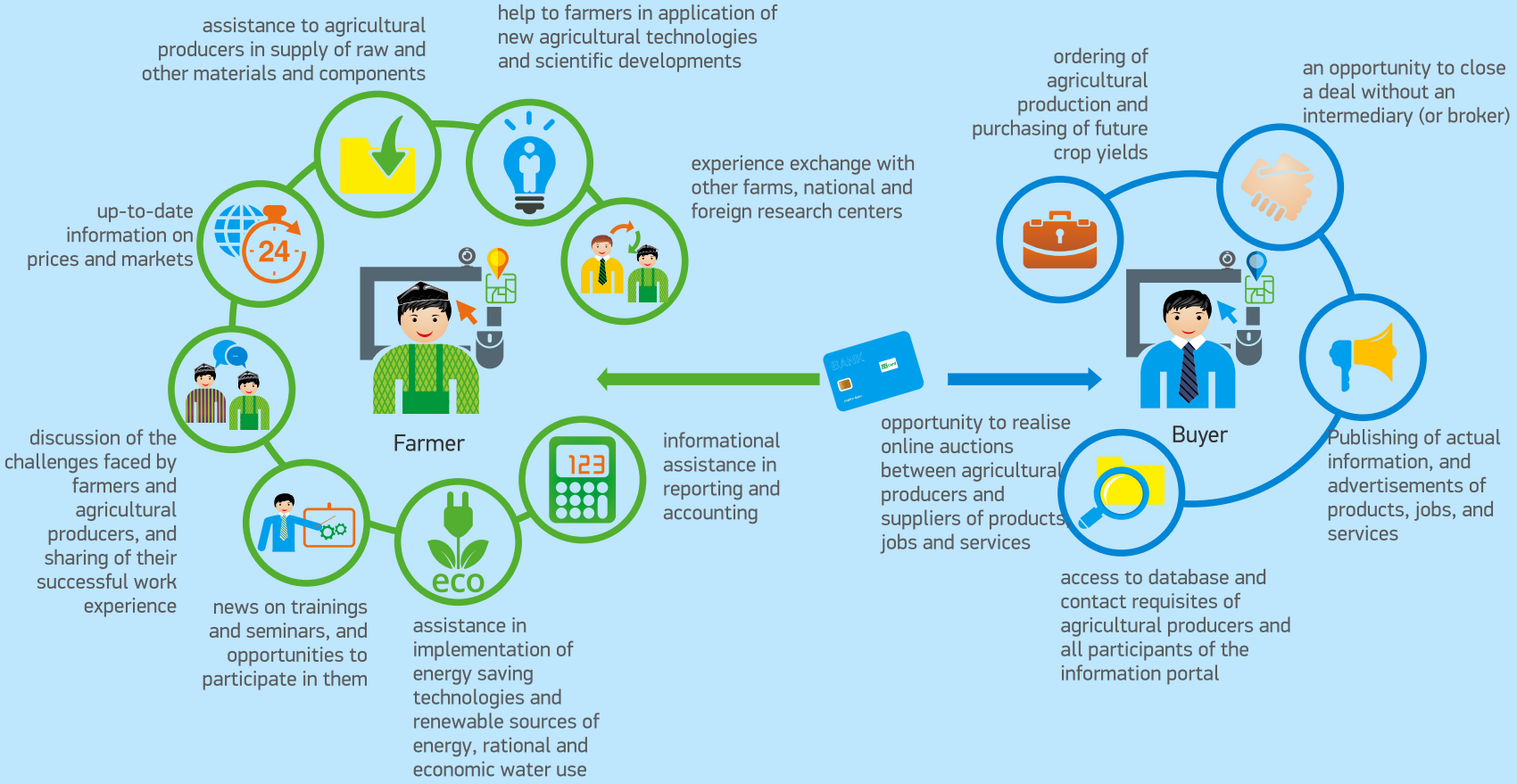
Financial institutions

Producers of ecological products

Suppliers of agricultural equipment and technologies




What the portal gives to visitors



On using the web portal, please contact Mr. Umid Inagamdjanov:
mobile tel.: + 998 94 645 47 91
e-mail: inagamdjanov@outlook.com
and GEF SGP in Uzbekistan:
tel.: + 998 71 120 34 50 (additional 145)
+ 998 71 120 34 62
mobile tel.: + 998 93 381 00 82
e-mail: alexey.volkov@undp.org

www.sgp.uz www.uz.undp.org

REVOLVING FUND FOR WATER LOSS REDUCTION

Current status of water management

Amu Darya
100%

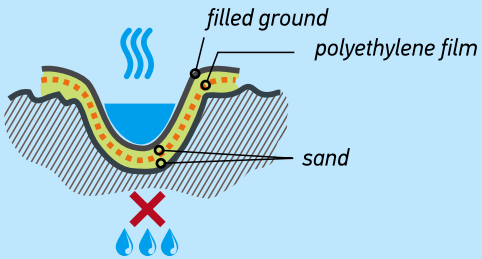
efficiency not more than
0,46-0,56

Losses
40-50%
evaporation and infiltration

Ground waters raise

secondary soil salinization

Suggested solution



the technology has been tested in the context of GEF SGP in 2009-2012 by the employees of the Urgench State University on the "Navruz-yap" canal

efficiency
0,56
0,89
increase by
1.5 times

save
4 mln m³
per 1 km of canal
no need for water pumps
+
additionally
276 ha
received water (per 1 km)

32
mln soums
cost of isolation of 1 km of canal

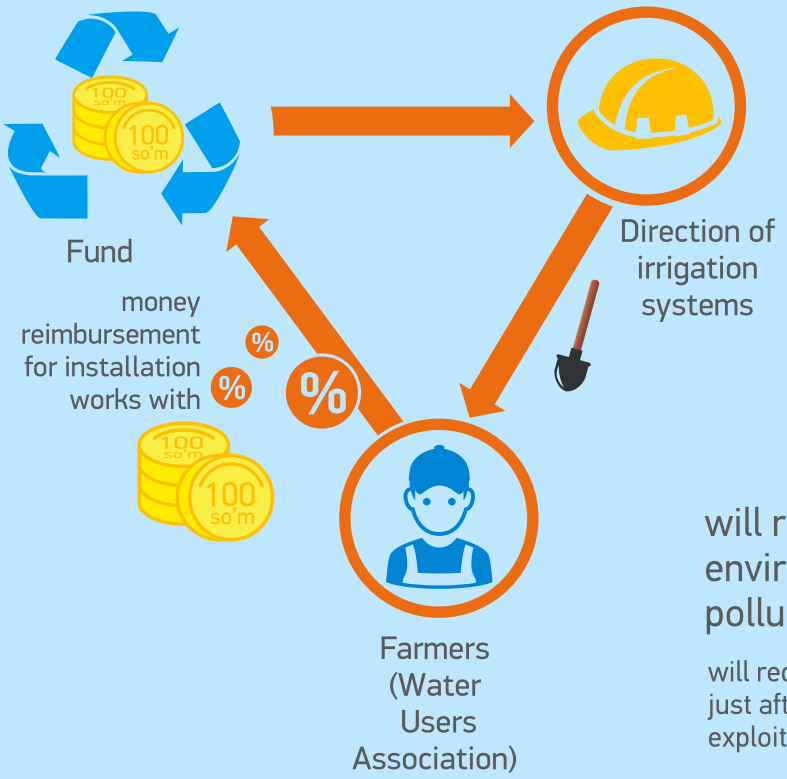
at the same time technology allows
to save money on electricity
+
to increase crop yield

Farmers do not hurry to invest [in the technology]
due to the scale **(20 km)** it will be possible to reduce the cost of anti-infiltration measures up to **21,5**

mln soums per 1 km




Work flow chart



Expected results of the project implementation

80 mln m^3
annual water savings
per 20 km of canals
will receive hydro isolation

Technology implementation will increase the crop yield and will allow to gain additional profit of
75 mln soums per 1 km

free-flow regime of canal will allow to abolish the use of water pumps
Savings on electricity
60 000 kW per 1 km

will reduce environmental pollution CO_2
will reduce costs on electricity bills just after the first year of technology exploitation **(7 mln soums)**

will improve the meliorative condition of
1878 ha of lands
15%
will increase crop yield

GEF Small Grants Programme invites interested district and regional Farmers' Unions, Water Users Association, and regional municipalities (khokimiyats) to test the technology of work of the revolving fund for the purpose of isolation of the irrigation canals. It will be especially interesting for the regions with problems in water supply.

GEF SGP in Uzbekistan:
tel.: + 998 71 120 34 50 (additional 145)
+ 998 71 120 34 62
mobile tel.: + 998 93 381 00 82
e-mail: alexey.volkov@undp.org

www.sgp.uz www.uz.undp.org

GREEN MINI-TECHNOLOGIES

The advantages of solar ovens

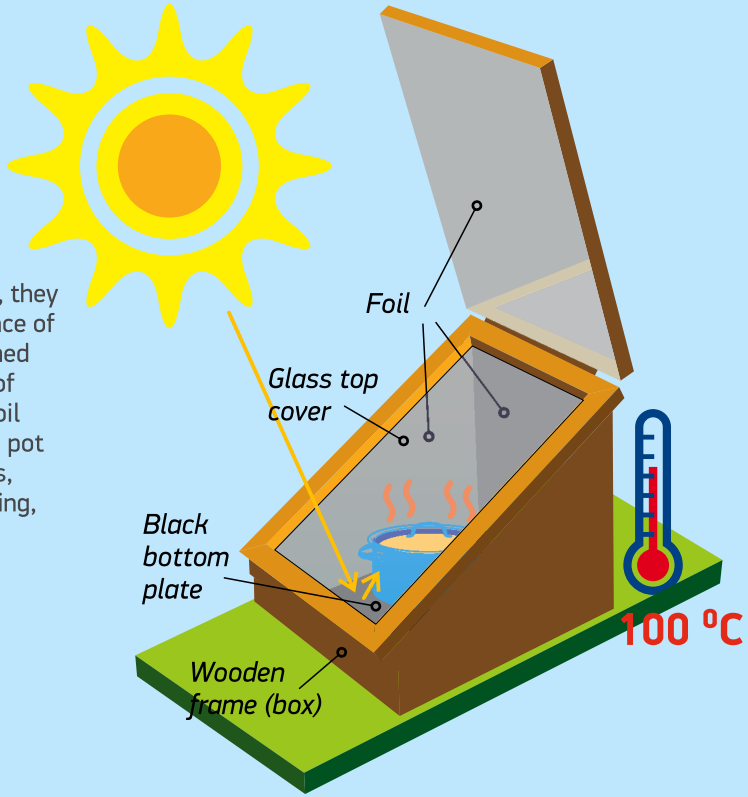
Can be quickly constructed, using simple materials at hand

Allows for the cooking of a wide range of meals (including baked bread rolls)

Saves money, as there is no need to purchase wood or fuel (it can save up to 600 kg of wood per year, or 4 trees!)

How Solar ovens work

When sun rays get into the box, they are absorbed by the black surface of the bottom plate and transformed into thermal energy. The sides of the box covered with foil; this foil reflects the rays on the cooking pot placed inside. As a result of this, as well as due to hermetic sealing, the temperature inside the box becomes suitable for cooking.



Fuel bricks and their advantages

Fuel bricks are pressed biomass or certain types of waste. This is a good alternative to wood used for regular home heating. These bricks can be produced using a briquetting machine.

Raw materials used for fuel bricks include the following: weeds, leafs and lops, peelings of grains, waste of wood processing, oil production and farming as well as organic household waste.

Burning 500 kg of fuel bricks gives thermal power equal to


500 kg of coal


800 kg of wood fuel or 5 trees


240 m³ of natural gas


250 liters of diesel fuel




The design and advantages of micro hydro power station

No natural landscape and environment disruption occurs during construction and while in operation

No negative impact on the water quality: it does not loose its natural properties, and it can be used for the public water supply.

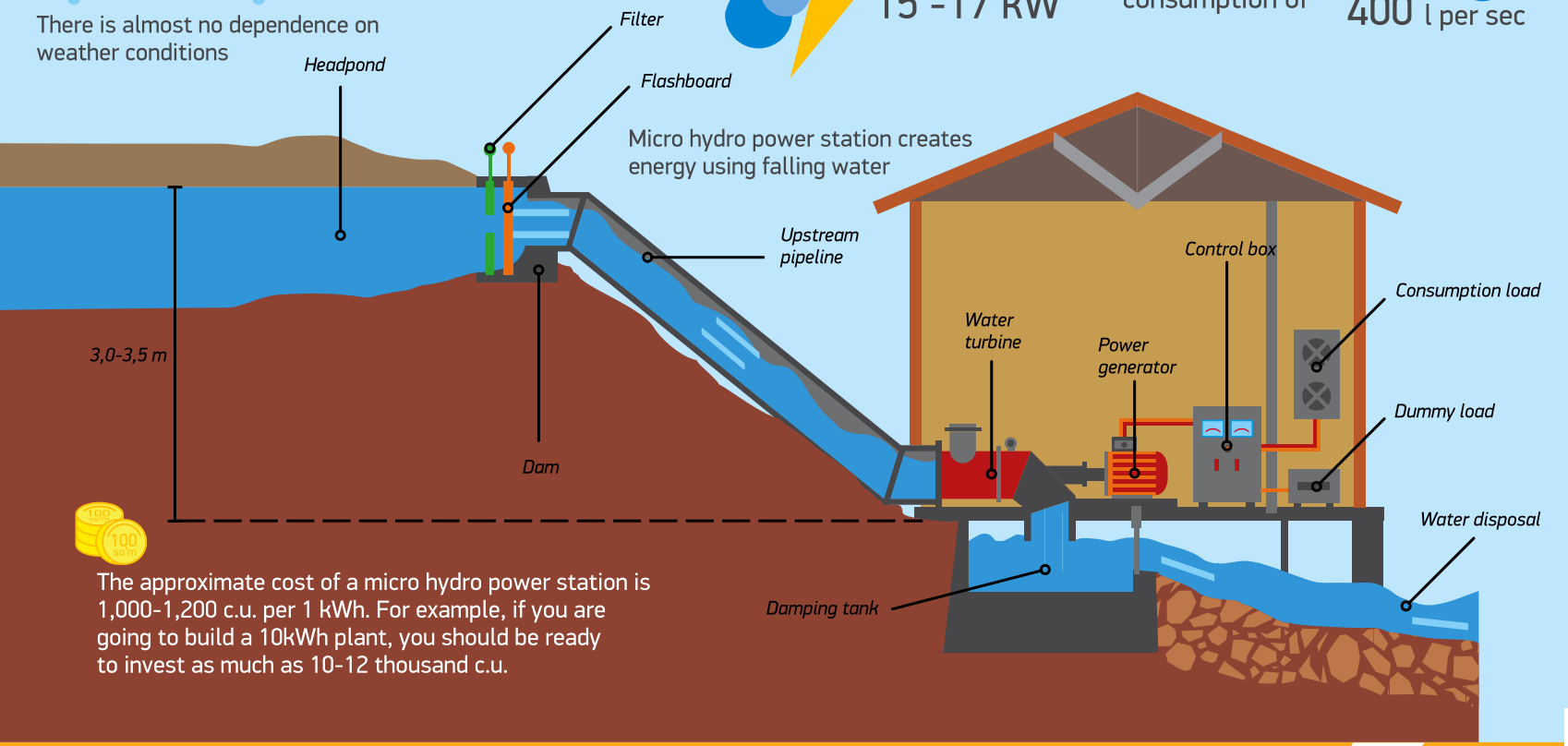
It provides a constant water supply to consumers during all seasons

Micro hydro power stations can be both constructed, and put in operation within a short period of time

There is almost no dependence on weather conditions

average power 15 -17 kW

at average water consumption of 250 - 400 l per sec



The approximate cost of a micro hydro power station is 1,000-1,200 c.u. per 1 kWh. For example, if you are going to build a 10kWh plant, you should be ready to invest as much as 10-12 thousand c.u.

For questions about the construction of mini technologies, please contact GEF SGP in Uzbekistan:
tel.: + 998 71 120 34 50 (additional 145)
+ 998 71 120 34 62
mobile tel.: + 998 93 381 00 82
e-mail: alexey.volkov@undp.org

www.sgp.uz www.uz.undp.org

AGROFORESTRY MEASURES FOR THE PREVENTION OF DEGRADATION IN PIEDMONT AND MOUNTANEOUS AREAS

Causes:

livestock overgrazing

falling trees and shrubs

the tilling of mountainous slopes

Problems:

the formation of destructive mudflows, and soil erosion.

road construction in mountain areas, and the undercutting of slopes using typical bulldozers without specialized machinery

A solution...

to prevent mudflow hazards, and ensure erosion control situation of

50-60%

of areas that should be forested.

Crop cultivation possibilities

Fruit crops

Apples, Cherry plums, Almonds, Walnuts, Pistachios, Pears, Apricots and Hawthorn

Please note that fruits should be planted at the distance favourable for growth; this is because they require species-specific space to maximize sunlight. The correct amount of space results in more effective fruit ripening, and higher yield.

Forest species

Native species: Semenov's maple, buckthorn, hackberry

Non-native species: Crimean pine, oak, acacia, ailanthus, mahaleb

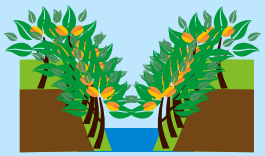
Forest species can be planted more densely than fruit crops. Dense planting increases their capacity to combat the erosion and degradation of soil. Dog rose and barberries are the best plants to plant in space between rows.

additional timber

profit from fruit yield

The benefits of long-term ecological security of local areas and prevention soil erosion due to longevity growth of the forest's trees.

How to cultivate forest species



forestation on streambeds

These species can create of terraces on mountain slopes.

This planting results in the creation of ravine-protecting, coast protecting, and flow regulating plants; this is important on slops that are already eroded.

Types of tillage:

on gentle slopes with a degree less than 8^0

In this case, tillage is not applied and for prevention of the surface flow and soil erosion; instead, the crop planting is preformed in the same manner as it would be on a plain; the techniques, however, would depend on the farming of a given crop.

Tillage terracing

The slope degree is more than $10\text{-}15^0$

Tillage is implemented using several approaches; this includes the use of a plough, and it involves permanent dumping down the slope.

Tillage by strips in places where the slope degree is not more than 10 -18

The width of a ploughed belt, and of spaces between strips, depends on the slop and the soil steepness; the more steep the slope is, the wider the strip (and, the area for the absorption of surface flow). Wild vegetation is left on untilled lane (the field boundary) to prevent erosion.

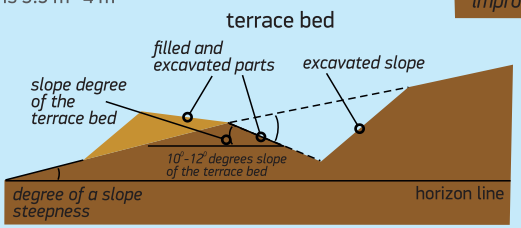
Excavated and filled terraces

$12\text{-}30^0$ slope degree is between

The terrace width is determined by the growing conditions.

in the case of forest species, the belt width is 2.3m - 2.5 m

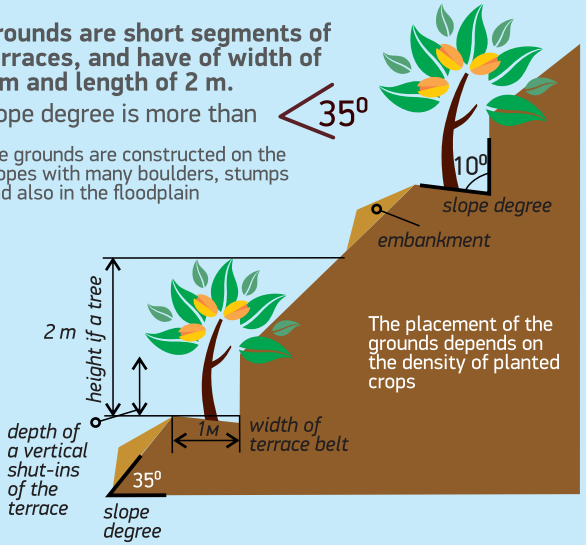
in the case of fruit species, the width is 3.5 m -4 m

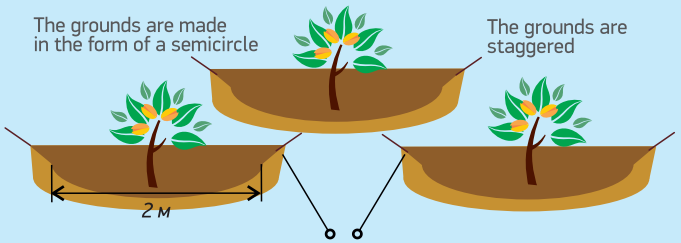


Grounds are short segments of terraces, and have of width of 1 m and length of 2 m.

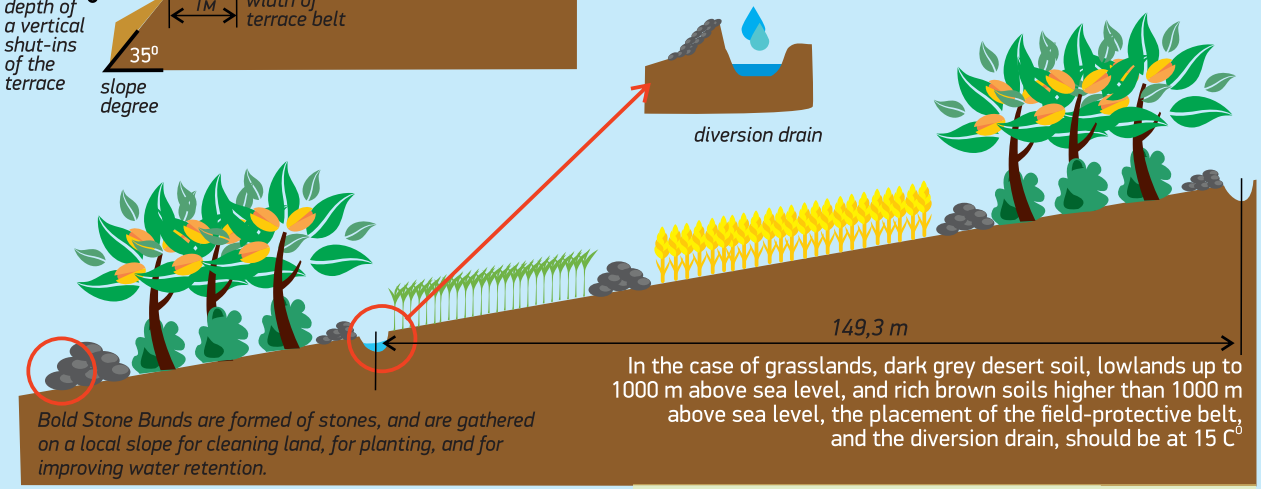
slope degree is more than 35^0

the grounds are constructed on the slopes with many boulders, stumps and also in the floodplain



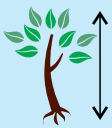


If the distance between plantings is big, then "spurs" can be created on the ground (from angles); this increases the ground bed, and the interception of water flow



Bold Stone Bunds are formed of stones, and are gathered on a local slope for cleaning land, for planting, and for improving water retention.

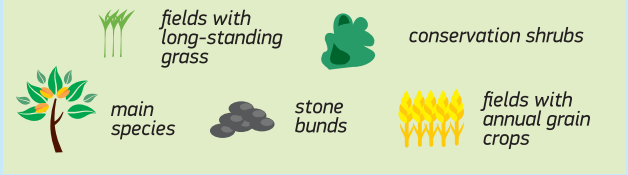
In the case of grasslands, dark grey desert soil, lowlands up to 1000 m above sea level, and rich brown soils higher than 1000 m above sea level, the placement of the field-protective belt, and the diversion drain, should be at 15 C^0



the height of a seedling is not less than 30 cm with a good root system

planting in fall and spring

mineral fertilizers (N-nitrogen, P-phosphorus, K-potassium)



For questions regarding the agroforestry measures and species for these measures, please contact Mr. Evgeniy Butkov:
tel.: +998 71 225 72 32
mobile tel.: +998 90 969 62 32
e-mail: urmonmanz@qsxv.uz

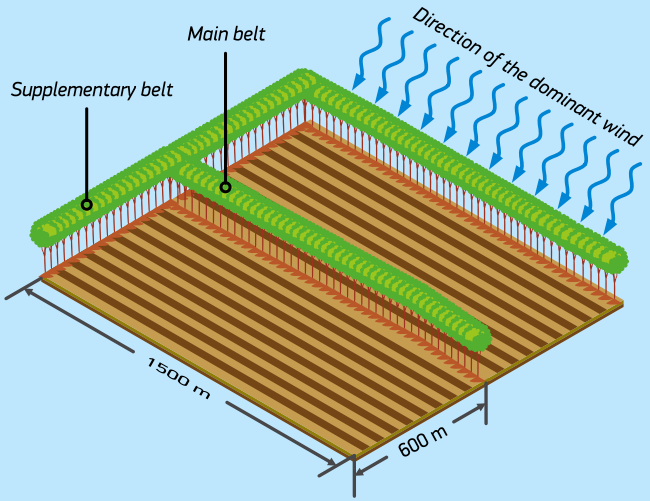
gef SGP The GEF Small Grants Programme UNDP Uzbekistan
www.sgp.uz www.uz.undp.org

FIELD-PROTECTIVE BELTS AND HABITATS OF NATURAL POLLINATORS AS AN INDICATOR OF AGRICULTURAL CROP IMPROVEMENT

Field-protective belts consist of several rows of trees and bushes that protect fields from wind erosion and improve their microclimate.

Abatement of the wind velocity influences all other microclimate parameters of the area, such as air humidity, the temperature of air and soil, and conditions for biodiversity existence.

Structure of the field-protective belt system on the plough land



Main issues of saving land capacity

Aridization

of the soil and the surface air brings changes in the structure and removal of the fertile topsoil

Wind erosion

is one of the main factors for loss of both the fertile topsoil and its capacity

Loss of crop

Summer wind with low air humidity and high temperature leads to loss of the crop

Advantages of the field-protective belts on irrigated and dry lands and their benefits for nature

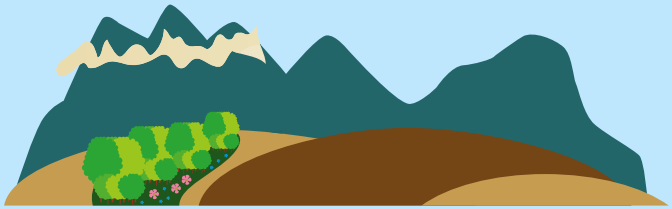
- Crop yield and quality of the crop is increased by up to 15-20%
- Wind velocity is decreased by 34-38% and humidity of the surface air is increased by up to 5-9%
- Increase of biodiversity and landscape capacity contribute to growth of the soil microfauna
- Decrease of the wind velocity halts the loss of the topsoil
- Air temperature is decreased by 1°C in the summer and soil temperature drops down to 1.2°C
- Lowering the groundwater level leads to decline of resalinization

For more details about field-protective belts, please visit GEF SGP website www.sgp.uz




Natural pollinators are the guarantors of the country's food security.

Natural (wild) pollinators eat nectar and pollen of plants and, like melliferous bees, help agricultural crops to breed. Wild pollinators work closely to their nests.



Therefore, farmers should:

- create habitats for natural pollinators in the form of field-protective belts or virgin areas with wild vegetation;
- plant melliferous crops;
- attract local beekeepers or create their own apiaries for increasing the efficiency of cross pollination and, as a result, increasing of agricultural crop yield.

Importance of natural pollinators for agricultural crops

1 **Cross pollination** → 2 **Genetic diversity** → 3 **Adaptation and sustainability of ecosystems to climate change** → 4 **Yield increase up to 35% in some cases**

More than **200 000** species help plants to breed. The more pollinators there are, the better the crop (in terms of quantity and quality).

Natural pollinators

Insects **Birds** **Bats**

For example, some varieties of cotton disclose the flowers at night and are pollinated by bats (i.e. the plant is adapting to its pollinator).

60–90%

of various plants require natural pollinators

Such types of plants include cotton, berries, watermelons, sunflower, alfalfa, cucumbers, tomatos, various grass and weed plants.

For example: double benefit from the hoverfly (Syrphidae) and lacefly (Chrysoperla carnea)

Larvae of hoverflies and laceflies are predators that eat fruit aphid, various mites and eggs of some insects in large quantities, thus protecting plants from pests.

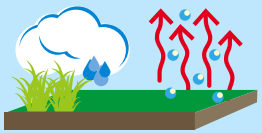
Adult hoverflies and laceflies are inoffensive vegetarians that eat nectar, honeydew, and pollen.

For questions regarding the establishment of field-protective belts, please contact Mr. Evgeniy Botman:
mobile tel.: +998 90 174-53-85
e-mail: darhanbek@yandex.com
For questions regarding the protection of natural pollinators, please contact Ms. Dilosa Daminova:
mobile tel.: +998 90 355 42 06
e-mail: botany@uzsci.net

gef SGP The GEF Small Grants Programme UNDP Uzbekistan
www.sgp.uz www.uz.undp.org

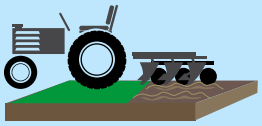
A GARDEN ON RAINFED FARMING LAND

What do we have on not irrigated land now?



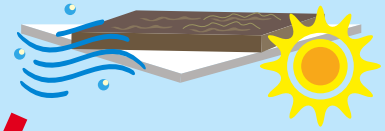
less precipitations, more evaporation

livestock destroys vegetation



tillage uncovers the soil

the wind removes all remaining moisture from the uncovered land

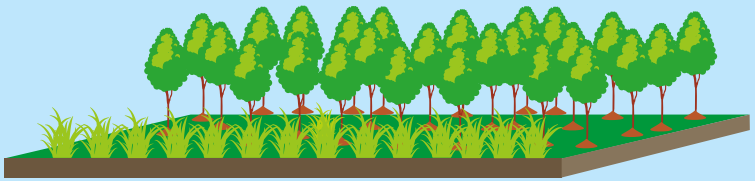


uncovered land under the burning sun

humus-producing microorganisms die in the soil

the soil is degraded; fertility and crop capacity is decreased on the rainfed farming lands

What is necessary for rainfed farming lands?



vegetation

How to create "healthy" rainfed farming lands?

Barriers

lack of water

expensive infrastructure for extraction, transportation, and consumption of water

few positive examples

What should be done?

Do not till rainfed farming lands

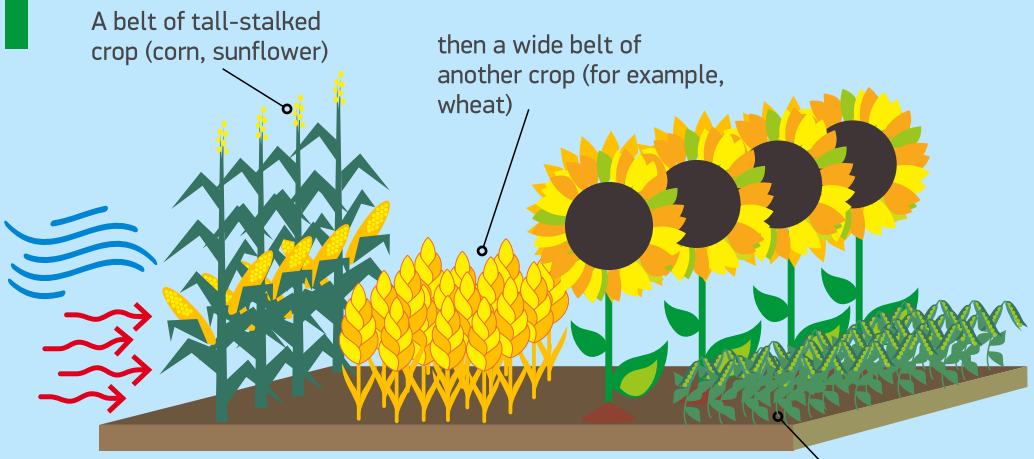
Cultivate dry cultures

Use mulch and always keep the soil covered and protected from burning sunbeams

Create agroforestry and wayside systems on rainfed farming lands

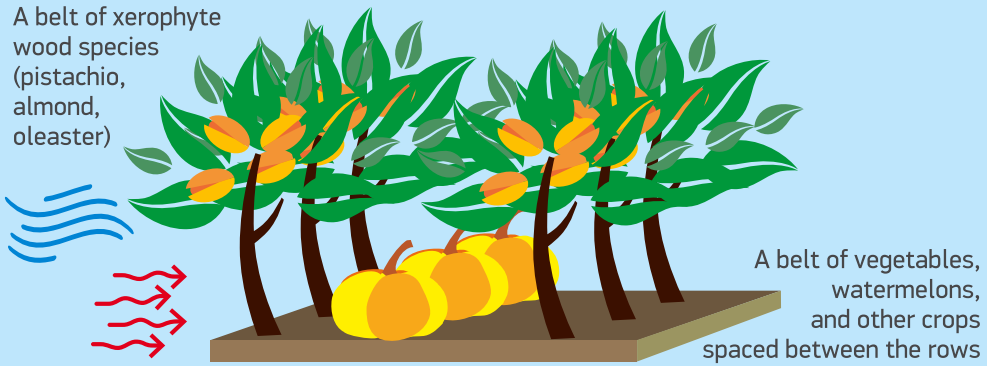
Example: In Australia a no-tillage practice was first introduced on rainfed farming lands in 1982 because a traditional tillage usually did not produce any crop. With the help of no-tillage, the wheat crop on rainfed farming lands equals 2.2 tons/ha in the presence of 250 mm of precipitation per year.

How to create wayside (flap) plantings?



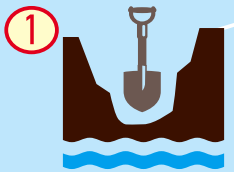
The belts should be perpendicular to the prevailing winds in the locality

How to create agroforestry systems?



The belts should be perpendicular to prevailing winds in the locality

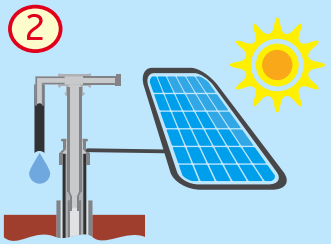
How to irrigate trees on rainfed farming lands?



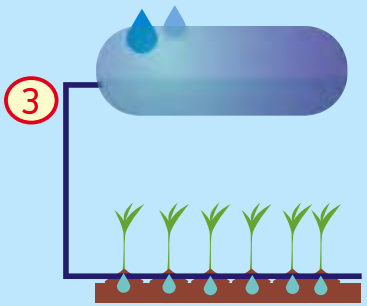
have or dig a borehole

There is no need for individuals who intend to implement an individual water intake from groundwater up to 5 cubic metres per day to get permission for boring.

Resolution of the Cabinet of Ministers RUz as of 4 August 2014 #214



install a pump operating on solar energy (photoelectric), pump, a foot pump or any other means, which is independent from the connection to the electric power system



install a container for collecting and storing water

part the branches of a drip irrigation system from the container

For more information, please visit the GEF SGP in Uzbekistan website: www.sgp.uz
tel.: + 998 71 120 34 50 (additional 145)
+ 998 71 120 34 62
mobile tel.: + 998 93 381 00 82
e-mail: alexey.volkov@undp.org

www.sgp.uz www.uz.undp.org

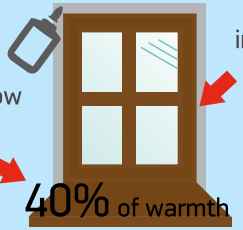
ENERGY EFFICIENCY IN RURAL AREAS

Energy efficiency will help you to:

- domestic energy costs ↓
- energy costs (on firewood and coal) ↓
- save time on search and purchase of combustibles ↑
- comfort in house (it is warmer in winter; and colder in summer)

How to realise it? There are a few ways:

1. Thermal insulation in a house

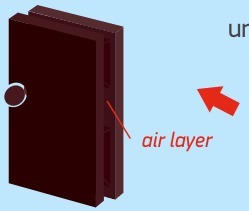


seal the cavities between the window stool and window with spray foams

insulate window with sealant

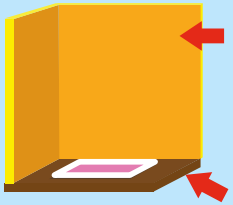
double glazing window installation

40% of warmth is lost because of uninsulated windows



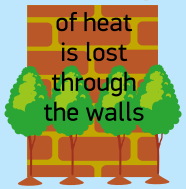
30% of warmth is lost

install the second entrance door and insulate it with rubber seal



insulate the wall by materials with low heat conductivity (wood, plywood, foam plastic, mineral wool)

insulate the floors with the same materials as walls and lay a carpet



plant trees in front of the house walls so that they protect the house from wind, and in summer - from heat, by shadow

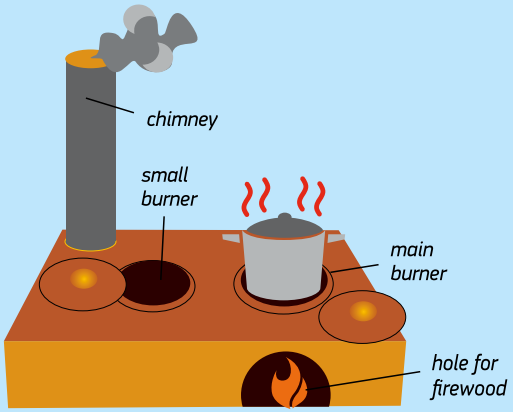
2. Annual trees planting for firewood

1 m^3 of firewood = 4 cut trees

Calculate how much firewood your family consumes. Calculate how many trees would it be, and plant this quantity annually. In the coming years you can cut tree branches for firewood.

For example, plant acacia in two rows and cut trees of 2 meters high annually 1 row. Thus, each row of trees (in turns) will be restored and grow faster, and you will get firewood on a yearly basis!

3. Efficient stove for food



puddle up the cracks of the stove so that the fire goes directly to food preparation

firewood consumption by 50%

If...

3-3,5 millions of rural houses in Uzbekistan

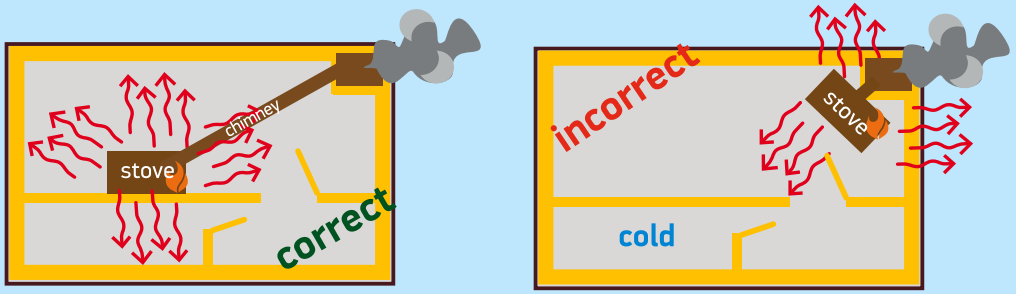
save

x 1 m³/year (4) = of cut trees

will be saved 12-14 millions of trees

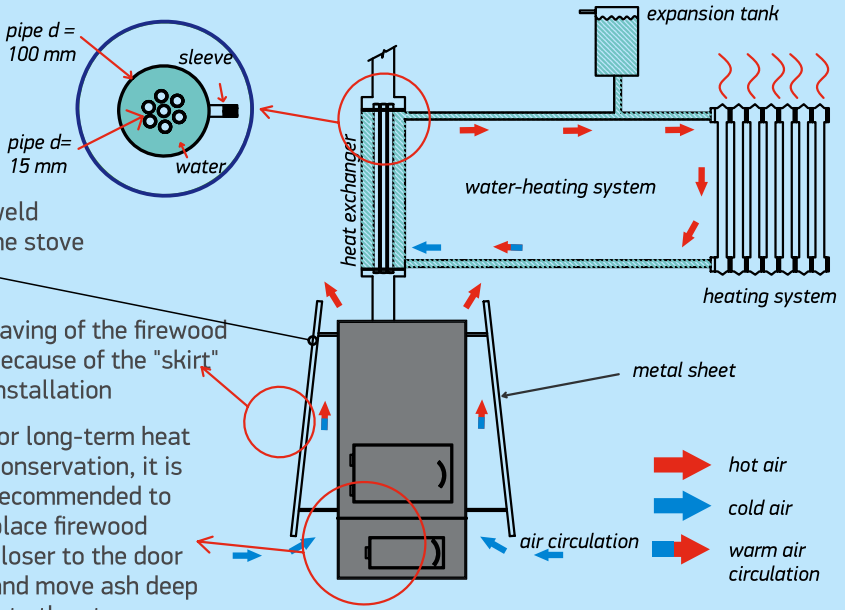
4. Efficient stove for heating

Stove disposition



install heat exchanger on the chimney of the wood stove:

More surface, more heat!



More information can be found on:
www.beeca.net, www.uz.undp.org, www.sgp.uz, www.biom.kg
GEF SGP in Uzbekistan:
tel.: + 998 71 120 34 50 (additional 145)
+ 998 71 120 34 62
mobile tel.: + 998 93 381 00 82
e-mail: alexey.volkov@undp.org

www.sgp.uz www.uz.undp.org

PASSIVE SOLAR GREENHOUSES (PST) AS A SMALL BUSINESS FOR HOUSEHOLDS

The passive solar greenhouse is a type of greenhouse that captures and retains solar power in sufficient amounts for planting vegetables with no or minimal additional heating. Temperatures in the greenhouse during winter are between +5 and +15 C. It is constructed in such a way that captured solar energy creates a micro-climate suitable for year-round plant cultivation.

Advantages of passive solar greenhouses:

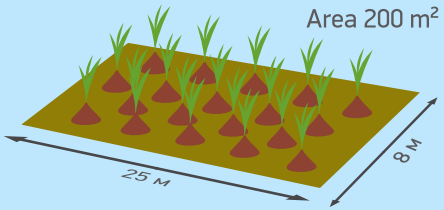
- All-season planting
- Does not require much time or money to operate
- Low construction costs (approx. 10 mln soums per 2 acres)
- All expenses can be covered within two years if all requirements are met
- Gas, wood and other fuels are not required for heating - only solar power is used

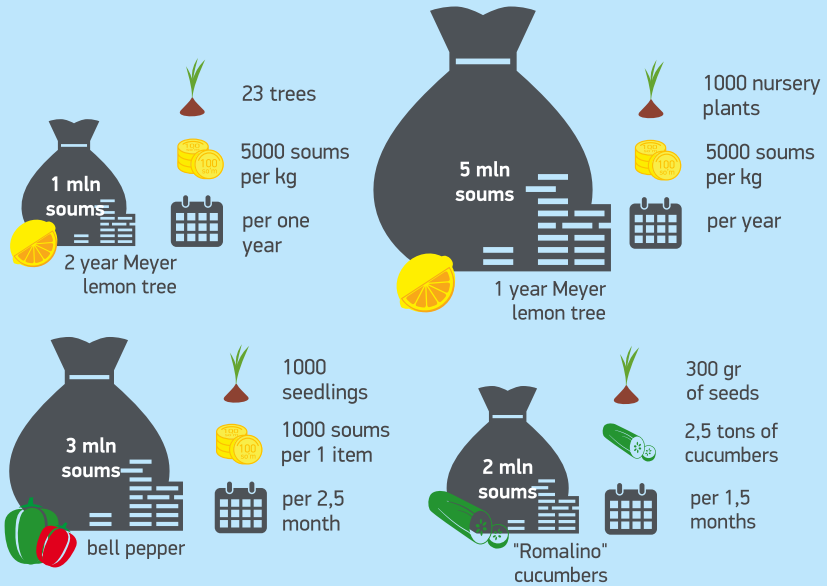
Crops that can be planted in PST:

lemons, cucumbers, tomatoes, bell peppers, herbs, onions, mushrooms, flowers

Profits from planting fruit and vegetables in PST - examples from the GEF SGP project

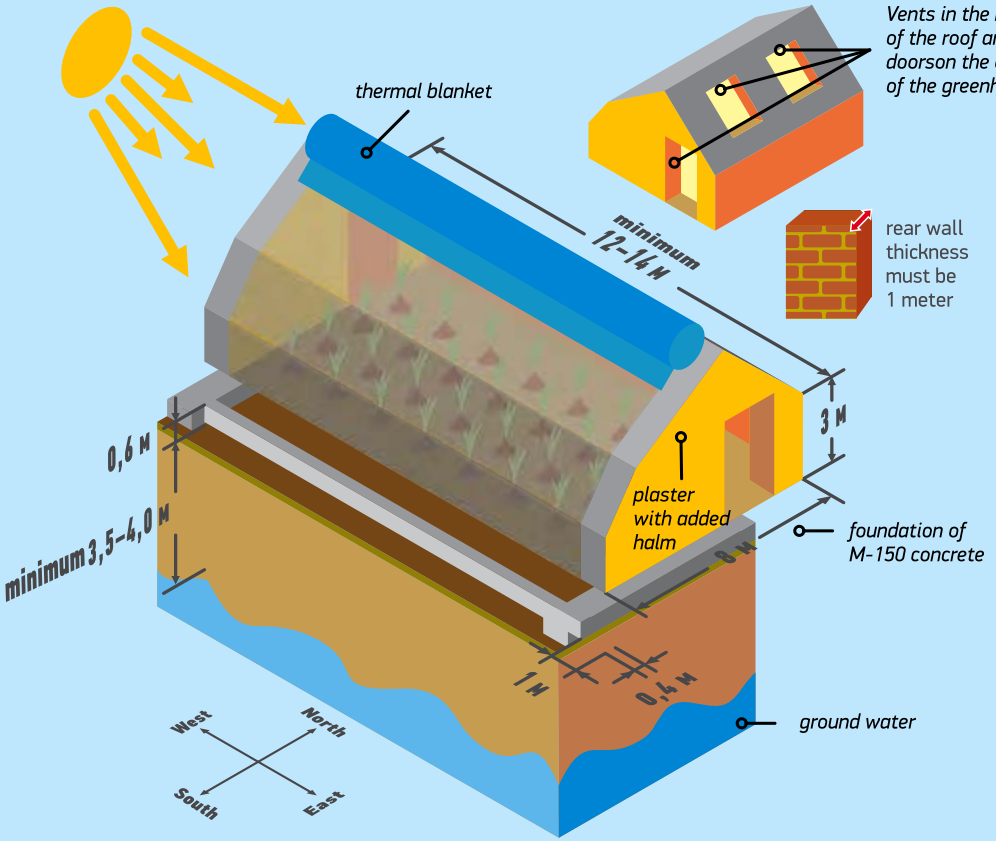
The largest profit is provided by bell peppers (also known as capsicum). The project has also demonstrated high profitability in growing Meyer lemons with vegetables planted in between the rows, giving the highest return.

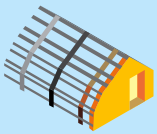




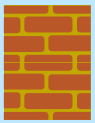



Passive solar greenhouse construction features



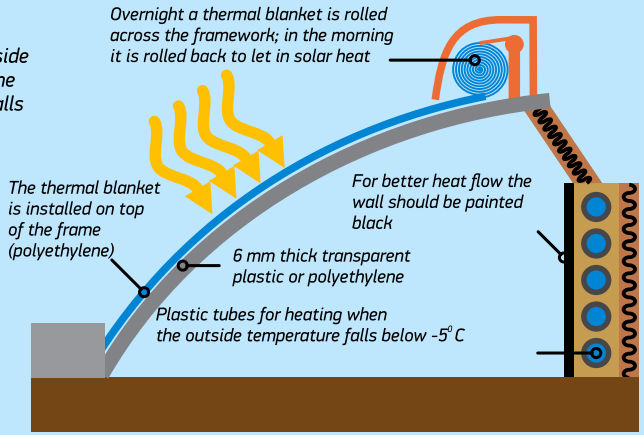


metal pipes, timber beams and stem wood can be used for pillars and support structures



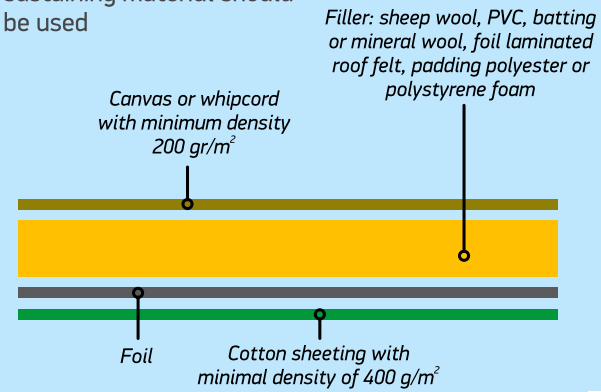
the walls of the greenhouse can be constructed using clay, raw bricks or composites (e.g. planks with raw bricks)

South ⟷ North



Thermal blanket structure

For the construction of the thermal blanket only water resistant and load sustaining material should be used



For questions regarding the solar greenhouses, please contact Mr. Abdumurod Ashurov:
mobile tel.: +998 91 637 22 69
e-mail: hayr_uz@mail.ru

gef SGP The GEF Small Grants Programme UNDP Uzbekistan
www.sgp.uz www.uz.undp.org

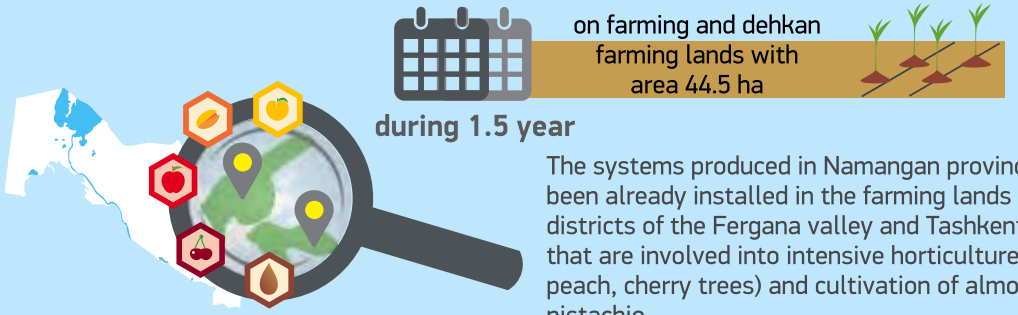
DRIP IRRIGATION IN UZBEKISTAN
The GEF SGP experience in Namangan province

Drip irrigation is a system delivering water and required fertilizers directly to the root zone of an irrigated plant.

The amount and frequency of water supply is regulated in accordance with the needs of a plant.

Water is delivered to all plants evenly in the required and equal amount, without floods and water loss.

Besides, huge losses of water due to evaporation during delivery of water to the plant are decreased.



The systems produced in Namangan province have been already installed in the farming lands in some districts of the Fergana valley and Tashkent province that are involved into intensive horticulture (apple, peach, cherry trees) and cultivation of almond and pistachio.

Advantages of drip irrigation system

2-5 times water consumption is decreased

30-50% increase of the crop yield

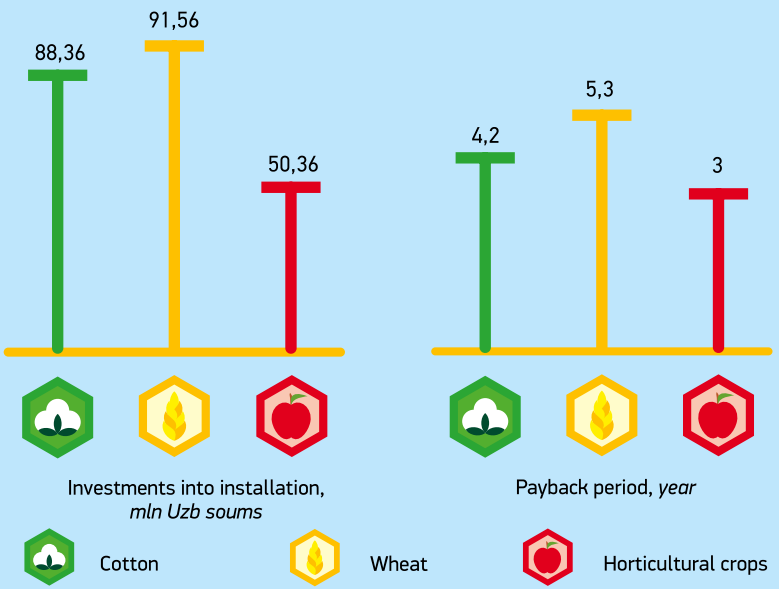
30-40% savings of mineral fertilizers

50-70% energy savings for various works

50% less expenses for labour force

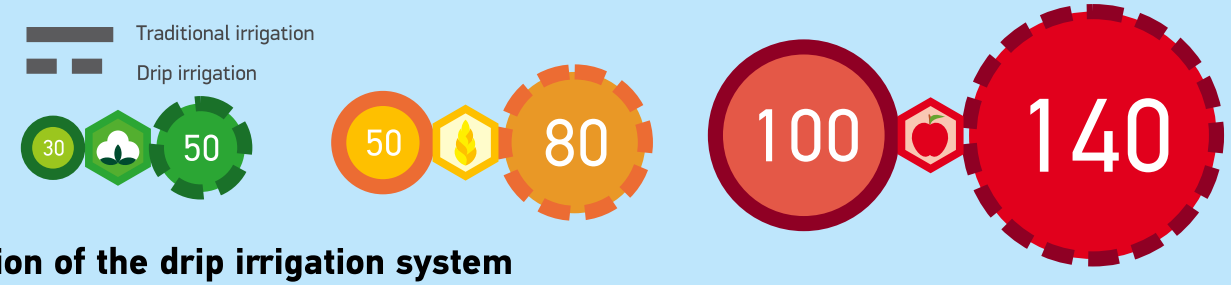
5 years exemption from single tax for the area under DIS

Recoupment of funds invested into drip irrigation system





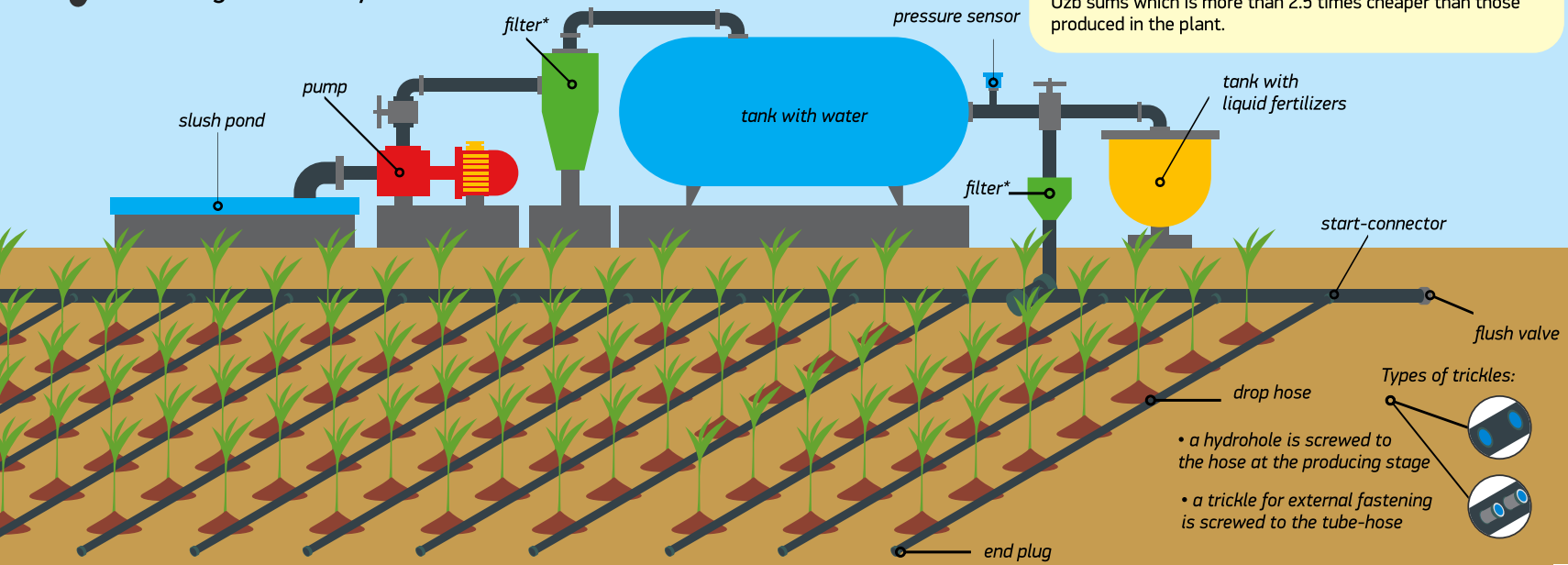

Crop capacity in cases of traditional irrigation and drip irrigation, c/ha



Construction of the drip irrigation system

DIS operation life for cotton (wheat) field - 10 years, for garden - 20 years

* A. Boltabaev, a producer of drip irrigation systems started to produce a cheap alternative of filter washer FS-35/5 with a capacity equaling to 90 m³/h. Price of the filter is 1.5 mln Uzb sums which is more than 2.5 times cheaper than those produced in the plant.

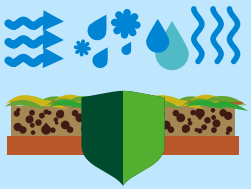


For questions regarding the drip irrigation system, please contact the producer in Namangan province Mr. Abdulvohid Boltabaev:
cell: +998 93 495 11 98
e-mail: abdulvohid.b@mail.ru

www.sgp.uz www.uz.undp.org

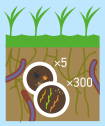
CONSERVATION FARMING
GEF SGP experience in Karakalpakstan

No-tillage is an alternative method of land cultivation for cropping without tillage or other operations by directly seedling crops with a special seeding-machine for soil covered with a mulch of plant residue from the previous yield.



Mulch is ground (with the use of KIR-1.5) and equally distributed plant residue composed of straw and green manure crops that protect soil from excessive heating, retain moisture, reduce salinity, and enrich it with valuable organic material.

Advantages of no-tillage

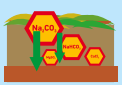


Recovery of soil fertility

All methods of no-tillage contribute to biological activity in soil which activates processes of recovery of soil fertility.

Restoration of soil moisture

Mulching helps to preserve moisture and allows plants to use it efficiently during the vegetative period, thus reducing the need for irrigation.



Reduction of seasonal saline accumulation

Preserved plant residues decrease evaporation from soil and reduce seasonal saline accumulation by 1.6-4 times in comparison with a plot without vegetation.

Increase of profitability

Due to the decrease in tillage activities (only direct seedling) and mulching, the following expenses are reduced: fuel, machinery use, material, labour and time, while crop yield is increased.

Factors affecting soil fertility

Excessive mechanical processing

leads to grinding of the soil particles and higher level of wind erosion.

Absence of crop rotation

impoverishes the soil, depletes humus and contributes to the appearance of harmful pathogens.

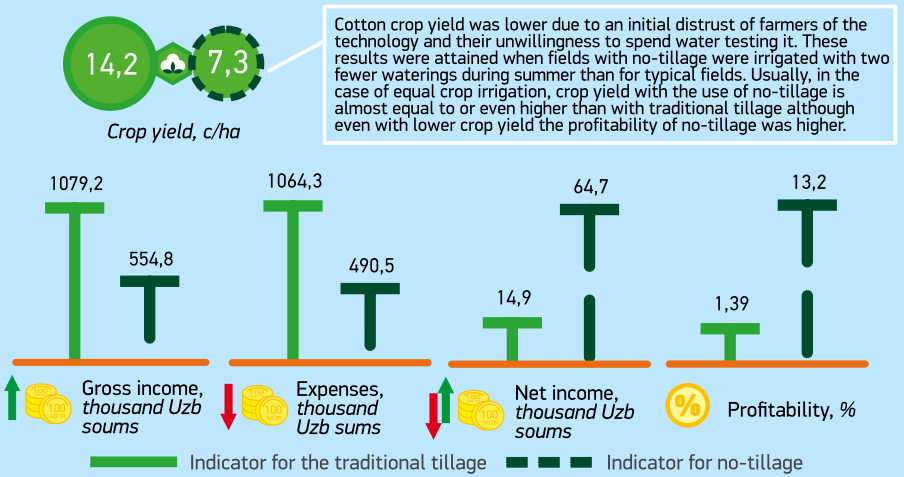
Removal or combustion of plant residues

from fields leads to soil dehydration, loss of fertility and deterioration of the soil structure.

Excessive use of water

leads to washing-out of useful minerals and nutrients from the soil.

Cost efficiency example: cotton cultivation in Karakalpakstan






No-tillage efficiency index

amount of extracted humus after cotton yield

For humus recovery the following is required at minimum:

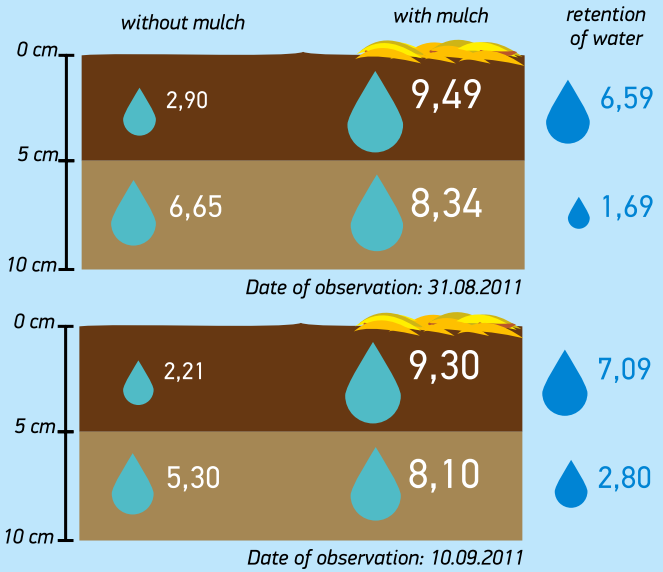
11-14 tons of dung per 1 ha

amount of recoverable humus from 1 ton of dung

6 tons of mulch per 1 ha

amount of recoverable humus from 1 ton of mulch

Effect of mulch on the soil moisture in *%*



Retention of soil moisture due to mulch:

233,4–276,9 m³/ha

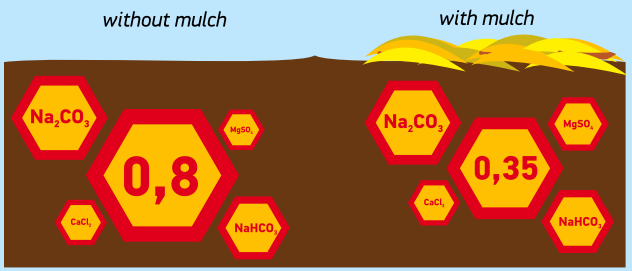
Total amount of water saved by preserving the soil moisture during the growing season and due to the reduction in saline accumulation by mulch:

2000 m³/ha

Water saved in the case of mulching during the annual flushing of salt from the soil:

1000 m³/ha

Average salinity of the soil, *% by solid residue*



For questions on the introduction of no-tillage technology, please contact Mr. Bakhitbay Aybergenov:
cell: +998 90 575 05 14
e-mail: aybahit@rambler.ru
and Mr. Oybek Egamberdiev:
cell: +998 91 571 72 39
e-mail: oybek_72@yahoo.com
kkrass@ymail.com

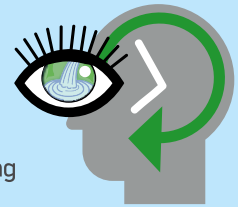
www.sgp.uz www.uz.undp.org

ECOTOURISM AS A WAY TO PRESERVE BIODIVERSITY IN UZBEKISTAN

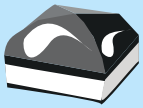
Ecotourism: Travel to fragile and pristine natural sites with ecological and sometimes cultural significance, with the goal of allowing visitors to learn about and appreciate the value of what they are seeing, while maintaining low negative impact on the site, providing funds for conservation and preservation activities, and opportunities for local engagement and empowerment.

The principles of ecotourism

preservation of the natural site that is visited

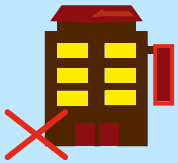


satisfaction in the tourist, in experiencing the natural site: seeing, understanding, making changes in behaviour toward preservation



involving and empowering the local people and increasing their income through the ecotourism activities

small scale and low traffic to ensure protection of the natural site



a mechanism for supporting the conservation effort: visitors spend money during the visit, and the finds are used for rehabilitation and preservation of the natural site

Benefits from ecotourism

for the country:

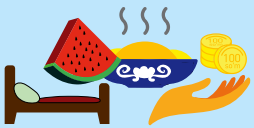
opportunities to rehabilitate and preserve natural sites through income generated when the ecotourists pay to experience the site and the educational activities at the site

cultural traditions, heritage and sites are often linked to important natural sites, and are part of the attraction of the ecotourism experience, creating opportunities to preserve culture and heritage as well

raising the national profile abroad through awareness of ecotourism experiences contributes to increased tourism of all kinds

creates opportunities for provincial investments where the natural sites are located

for local people:



creates new income opportunities

acts as a stimulus to the preservation of cultural traditions because they add value to the touristical experience

brings richness to the experience of local people through widening contacts, cultural exchange and the learning of foreign languages

increased awareness and understanding of the importance of conservation of natural sites and the environment

benefits for tourists:

ecotourists acquire new knowledge about nature, environment and culture in another country, and this accompanies them through life and their future actions

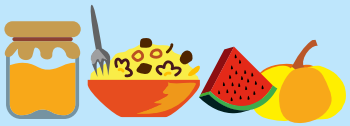
Example: distribution of benefits of a visit to a national park by an ecotourist

Ecotourist purchases a tour from a tour operator

a payment for the hotel at the national park

payments for flights, visa and ground transportation

a payment for the excursion around the national park



food purchases: cafes, restaurants, market stands, tastings of tradition foods and products

purchase of souvenirs

a safari-style tour by car on a dedicated road to ensure minimal impact to the nature and wildlife

visit to a cultural center and a tour to the streets and houses of an exotic village

excursion on horses and camels

Benefits:

to the country

to locals

to nature, National park

What is there for an ecotourist in Uzbekistan?

Ecocenter "Jeyran"

2 species of amphibians

over **250** species of plants including old growth grove with trees many centuries old

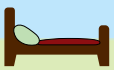
257 species of birds

over **1200** species of invertebrates

39 species of mamals including herds of wild horses and gazelles

20 species of reptiles

18 species of fish



1 night in a hotel

a standard room with kitchenette and shower costs 20 000 UZS/day/person for citizens of Uzbekistan, or 20 USD for foreigners

detailed calculations for various tours and accommodations are available at the Ecocenter website: http://www.ecocenter.uz/eks

Types of ecotourism

Birdwatching

Amateur ornithologists or birdwatchers travel to exotic locations for a glimpse of rare or elusive species. They have "life lists" of bird species they have seen, and will often spend significant amounts of money for the opportunity to add to their lists.

For example:

In the district of Farish, ecotourists could experience the pre-migratory gatherings of Norther Cranes.

Photography tours or photo hunting

Photographers and amateurs alike travel to exotic destinations to photograph landscapes and scenic views. In photo hunting, photographers shoot animals with their cameras rather than guns.

For example:

Photo hunting - a contest for the best photo of lizard, caracal, Ustyurt mountain sheep, hyena, snow leopard and others

Botanical tours

Plant lovers travel the world for the opportunity to study exotic flora in its natural habitat, and often document their expeditions in photo catalogues.

For example:

Find as many types of tulips or astragalus as possible and take their photos; exploring the saxaul bush ecosystems; or to experience the relict walnut forests

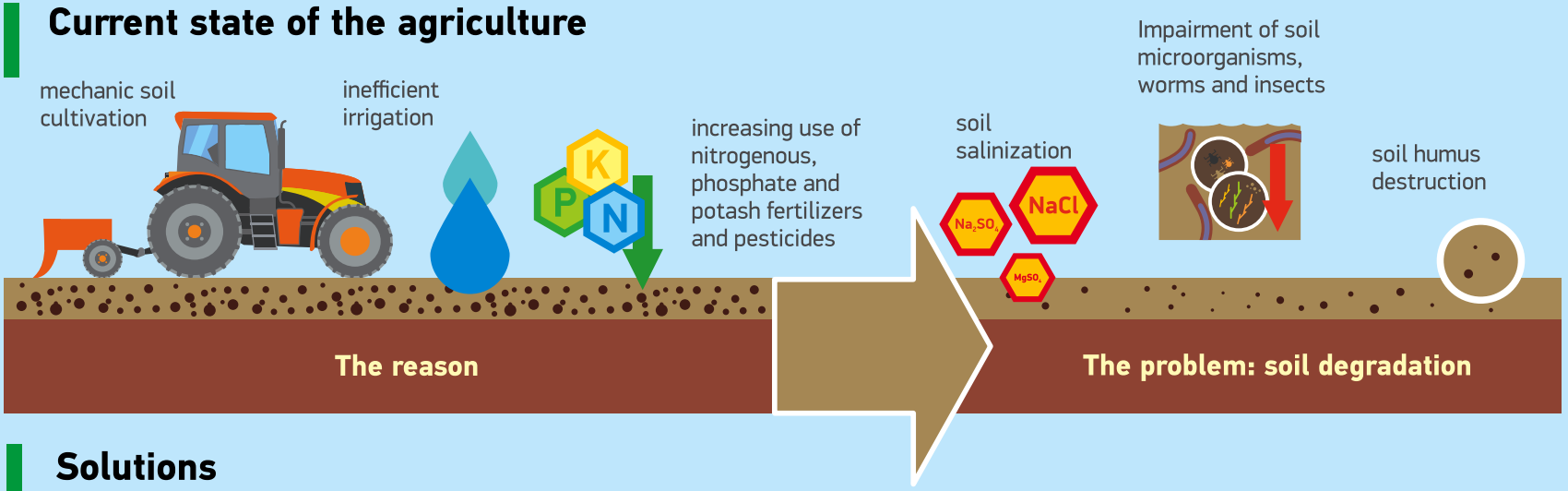
If you have an interest in participating in the development of an ecotourism project in Uzbekistan, please contact the GEF Small Grants Programme in Uzbekistan:

tel.: + 998 71 120 34 50 (additional 145)
+ 998 71 120 34 62
cell: + 998 93 381 00 82
e-mail: alexey.volkov@undp.org

www.sgp.uz www.uz.undp.org

SERHOSIL

Current state of the agriculture



Solutions

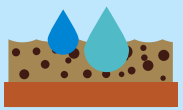
The transition from intensive technological methods of soil cultivation to organic farming includes:

no-tillage, mulching and crop rotation

Organic farming helps to improve the physical properties of soil. It provides for:

self-loosening

preservation of moisture in soil

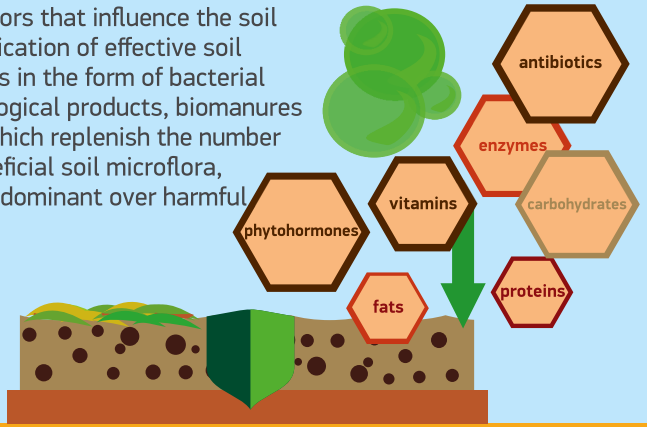


increasing water permeability

decreased soil erosion

The increasing concentration of organic substances enhances soil microbiological activity, improves its agrochemical and agrobiological state.

One of the factors that influence the soil fertility is application of effective soil microorganisms in the form of bacterial fertilizers, biological products, biomanures into the soil, which replenish the number of natural beneficial soil microflora, thus making it dominant over harmful soil microflora.

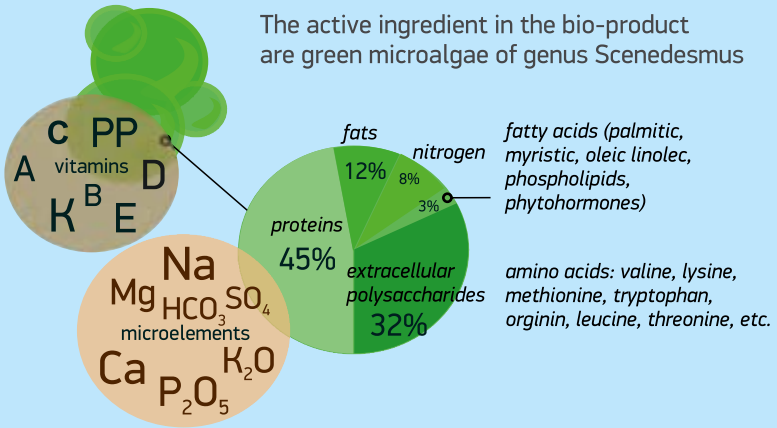


Serhosil: Composition and Advantages

Application of a new ecologically safe and growth stimulating biopreparation Serhosil, created at the Institute of microbiology of the Academy of Sciences of the Republic of Uzbekistan, is one of the means which can help to solve the agricultural problems.

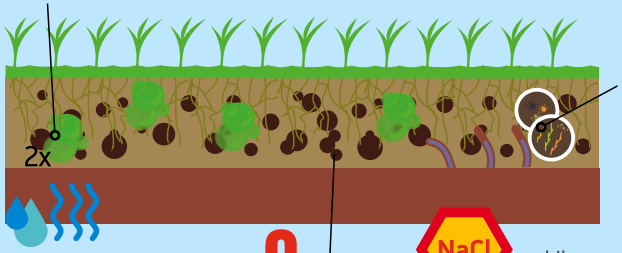
(patent # IAP 04933, 2014 y.)

The active ingredient in the bio-product are green microalgae of genus Scenedesmus



algae breed rapidly

up to 20 mln cells per 1 cm^2



the higher, plants' immunity the less is their morbidity, vermin effect, and endurance of weather changes

favourable conditions are created for breeding of beneficial soil microorganisms

the surface membranes of seaweeds can have anti-errosion value and affect the water relationships of the soil

the humus content in the soil increases, and soil becomes enriched with oxygen

while growing, micro-seaweeds absorb readily soluble mineral salts, which are processed by micro-seaweeds, then they are disengaged and afterwards they are assimilated by the roots of plants

water usage is reduced by 20-30% due to decrease in plant transpiration and soil water evaporation

the mineral fertilizers usage is reduced by 25-30% due to improvement in photosynthesis and better leaves and soil nutrition

when pathogenic bacteria and fungi, which cause diseases in plants, animals and humans, die, the soil becomes healthy and fertile, yield and quality of agricultural production increase, population health improves

I'm a farmer! I want to produce Serhosil myself.

What should I do?

build a small greenhouse for seaweed farming, according to the requirements of the Institute of Microbiology

obtain a license from the Institute of Microbiology of the Academy of Sciences of the Republic of Uzbekistan

purchase stock culture, nutriment, and instructions for processing a bio-product

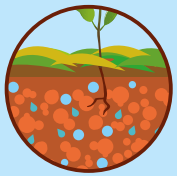
On bio-fertilizer's production and use, please contact Ms. Gulnara Dzhumaniyazova:
tel .: +998 71 262 14 38
mobile tel.: +998 90 318 25 59
e-mail: gulnara2559@mail.ru, nigora_1967@umail.uz

www.sgp.uz www.uz.undp.org

LAND MELIORATION PUT SIMPLY

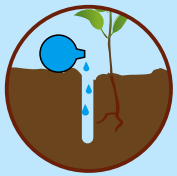
Melioration (lat. melioration - improvement) *- are practices aiming at improving soil characteristics, increasing its productivity.*

Melioration types or what to improve:



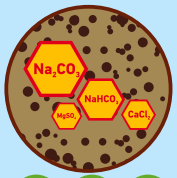
Strive against deterioration of water and air permeability and soil compaction

1 2 3 4 6 7 8



Achieve optimal soil moisture content ([with the help of] irrigation or drainage)

2 3 5 6 7 9



Strive against excessive salt concentration in soil

2 4 7 8 9

Reduce water and wind erosion of the fertile layer of soil

3 5 6 7

1 

No-till - sowing seeds without prior soil tillage.

2 

Mulching - refinement of plant remains and covering of the soil with the remains.

3 

Cover crops - at every moment soil should be covered with growing plants. It is advisable to use beans (legumes) as secondary crops.

4 

Organic fertilizers - are necessary to be applied for restoration of the lost soil organic matter. Application rate - is not less than 10 ton/ha. [It should be] combined with mulching and green manuring.

5 

Field protective forest belts - reduce the speed of surface wind, while preventing from soil moisture loss, wind erosion of the fertile layer of soil.

6 

Efficient watering techniques - watering provides for optimal (without excess or shortage) soil moisture content for plants growth and crop yield.

7 

Green manuring - ploughing green matter of specially cultivated secondary crops (green fertilizers) under the soil in order to enrich the soil with organic matter/humus.

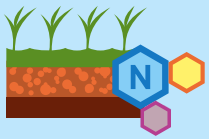
8 

Crop rotation - rotation of crop in order to achieve better systematic effect on crop yield of all the crops.

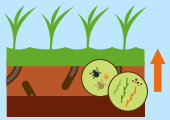
9 

Effective water supply - isolation of canal bottom and improved water allocation within Water Users Association.

When applying these methods of melioration, you can achieve:

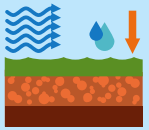


Enrichment of the tillable layer of soil with organic matter

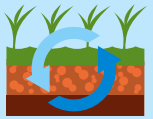


Increase in the activity of beneficent soil micro flora

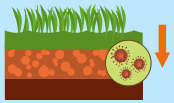
Retention of the essential soil moisture, without increasing water consumption



Lower the loss of fertile layer of soil caused by wind and water erosion



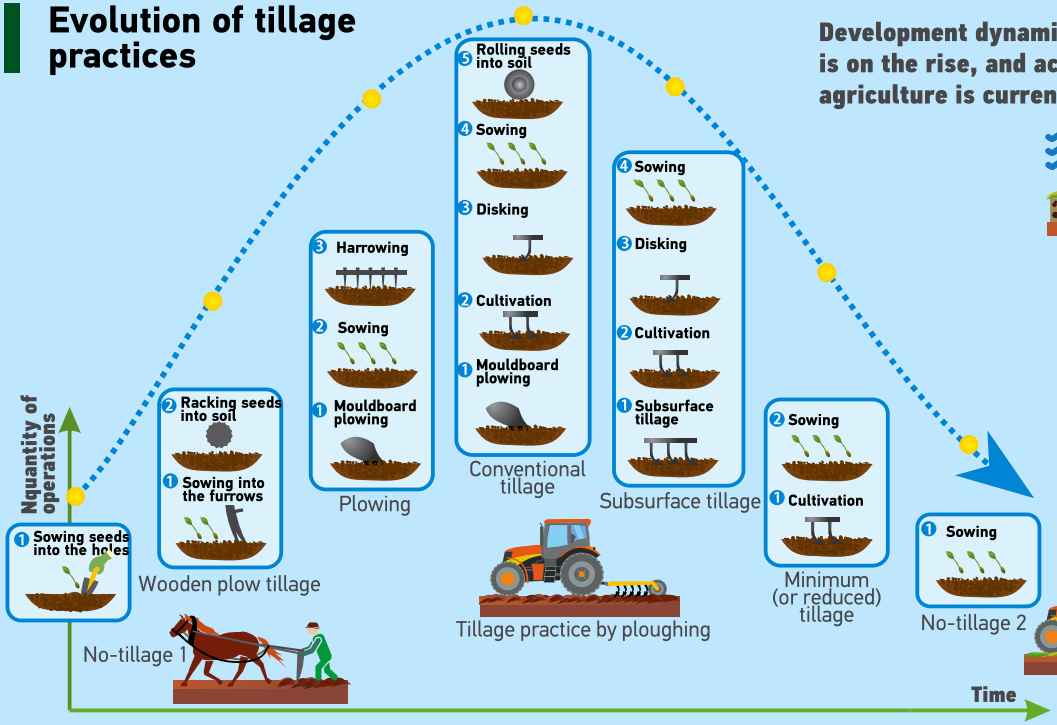
Improvement in soil self-loosening, increase in water and air permeability



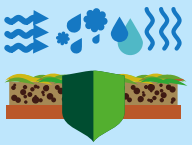
Decrease in number of weeds and plant diseases

You can preserve and increase soil fertility, and this means more crop yield in the future!

Evolution of tillage practices



Development dynamics of soil protective agriculture is on the rise, and according to FAO this type of agriculture is currently applied on approximately



125 mln ha of tillage, which is **9%** of all arable lands in the world on all continents and agricultural and economic zones

8 l when applying no-till

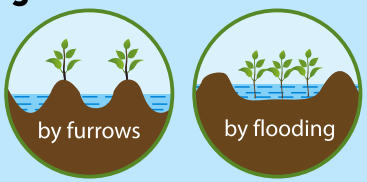
when applying traditional tillage **93 l**

Decrease in fuel and lubricants costs and in other costs by **30–50%**

Sources: 1. Kurdyumov N.I. "Mastery of [soil] fertility", ID VLADIS, Rostov/D RIPOL Classic, Moscow, 2008, 512 pages.
2. naturalworld.ru

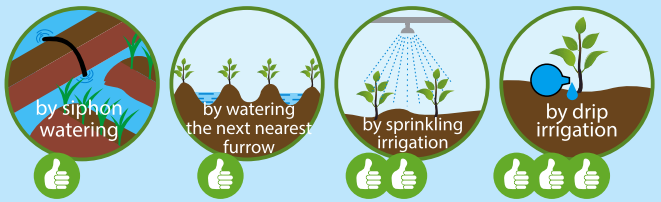
Efficient watering

Currently, from the water source it is taken **2** parts of plants' biological need for water



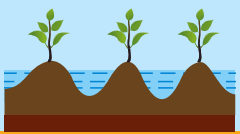
It is possible to take **1,4** part of plants' biological need for water

without canals' reconstruction



with regard to soil characteristics, depth of occurrence of groundwaters, and time (hour) of watering

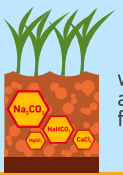
It is necessary to abandon gradually [the practices of]



traditional irrigation by furrow and by flooding

incorrect or excessive application of mineral soil fertilizers

excessive application of herbicides



washing of salinized agricultural lands by flooding

On melioration practices, please contact the GEF Small Grants Programm in Uzbekistan:
tel.: +998 71 120 34 50 (additional 145)
websites: http://water-salt.ru, http://water-salt.narod.ru, www.sgp.uz

gef SGP The GEF Small Grants Programme UNDP Uzbekistan

www.sgp.uz www.uz.undp.org

MICRO HYDRO POWER PLANT (HPP) FOR SMALL BUSINESSES

Micro hydro power plant (micro HPP) is a technology for obtaining electricity using energy from minor watercourses.

Capabilities for building HPPs in Uzbekistan*

Prospects of small hydroenergetics in Uzbekistan, *bln kW*h per annum*

4,07 bln kW*h per annum worth of undeveloped capabilities

5,92

1,85 bln kW*h per annum is the volume of electric power produced by minor rivers, reservoirs, and channels

656 rivers

Can be built on large and medium rivers **250** big and medium HPP

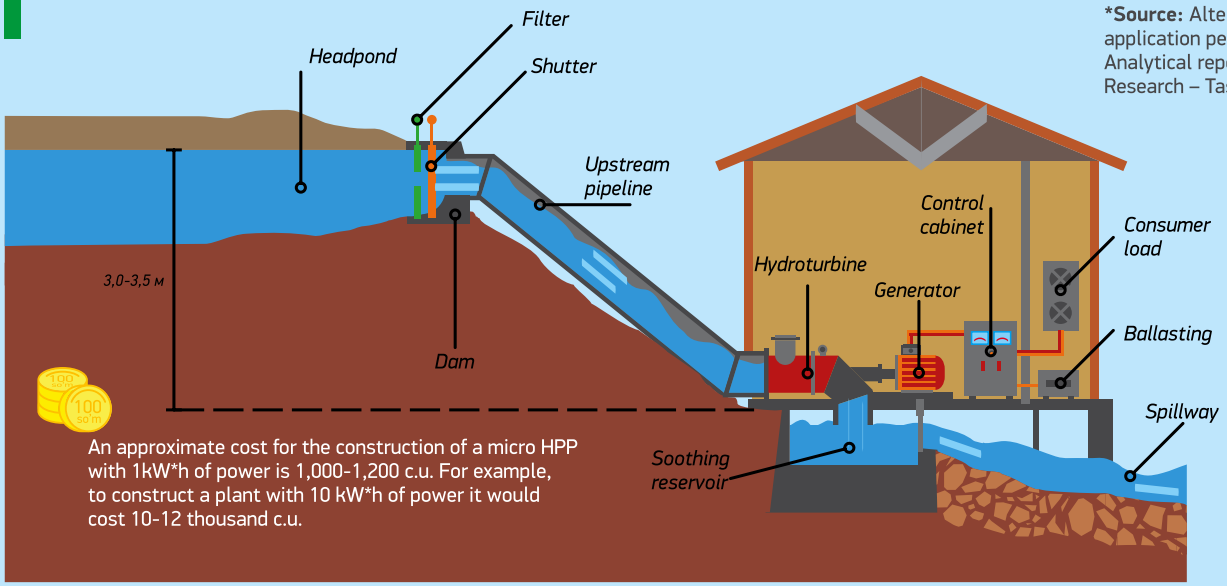
1100 small HPPs on tributaries

98 on channels and collectors

42 on water reservoirs

*Source: Alternative sources of energy: application perspectives in Uzbekistan Analytical report by the Center of Economic Research – Tashkent: CER, 2011

Micro hydro power plant scheme



An approximate cost for the construction of a micro HPP with 1kW*h of power is 1,000-1,200 c.u. For example, to construct a plant with 10 kW*h of power it would cost 10-12 thousand c.u.

Micro hydro power plant produces electricity from the energy of falling water

average power generated is **15-17 kW**

average water supply flow rate is **250-400** liters per second




Advantages of micro hydro power plants

landscape and environment are not destroyed during construction and operation

absence of negative influence on the water quality: it does not affect initial natural quality and can be used as a water supply for the population

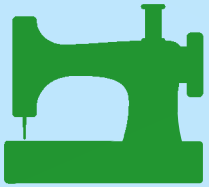
practically no dependence on weather conditions

consumers are supplied with cheap electricity at any time of the year

micro hydro power plants can be established and launched in a short time period

Micro HPP for small businesses in rural areas: What purposes can ONE micro HPP serve?

25-30 kW*h is enough to supply more developed businesses and services in rural areas with energy power, including:

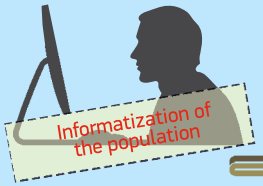


for supplying a sewing room or similar small enterprise with electric power and generating employment for 9 individuals

1 manager
4 tailors
2 clothing press operators
1 driver
1 accountant

for supplying a barber shop with electric power and generating employment for 5 persons

1 manager
4 barbers

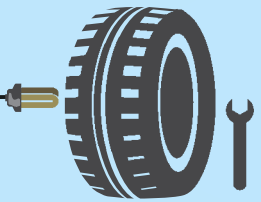


for supplying an internet cafe with electric power and generating employment for 2 individuals

1 manager
1 cashier

for supplying a shop with electric power and generating employment for 2 individuals

1 manager who is a driver and accountant at the same time
1 sales consultant



for supplying a tire assembling business with electric power and generating employment for 2 individuals

2 technicians

! ONE micro HPP with a capacity of 25-30 kW*h can supply power to ALL the businesses mentioned above and generate 20 job placements.

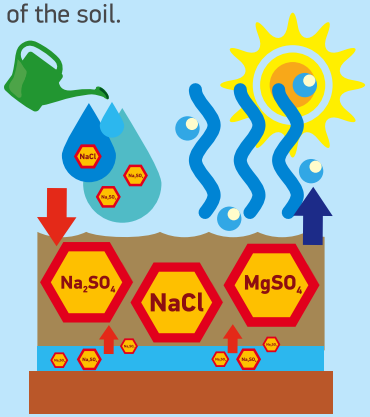
For questions on construction of micro hydro power plants, please contact Mr. Rustamjon Tashmuradov:
mobile tel.: +998 91 601 53 14
e-mail: atashmatov75@mail.ru
and Mr. Rakhmatulla Shodiev:
mobile tel.: +998 90 360 51 02
e-mail: oqmachit@mail.ru

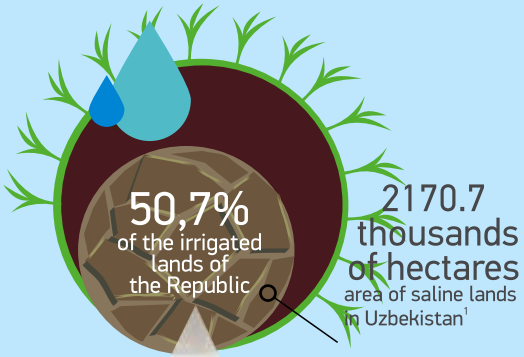
gef SGP The GEF Small Grants Programme UNDP Uzbekistan
www.sgp.uz www.uz.undp.org

SALT TOLERANT AND RESTORING SOIL CROPS

Problem

Salinisation is an excessive increase of water-soluble salts value in the root layer of the soil.





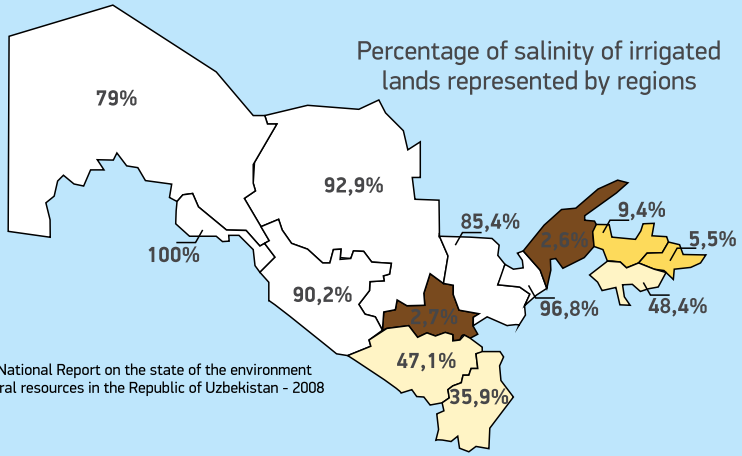
162.6 thousands of ha
highly saline lands

663.5 thousands of ha
moderately saline lands

1344.6 thousands of ha
slightly saline lands

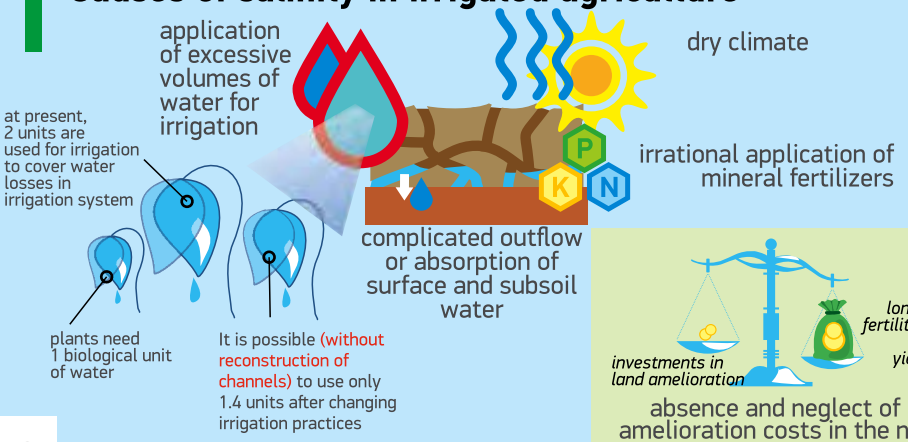
17.5 thousands of ha
non-saline lands

Percentage of salinity of irrigated lands represented by regions

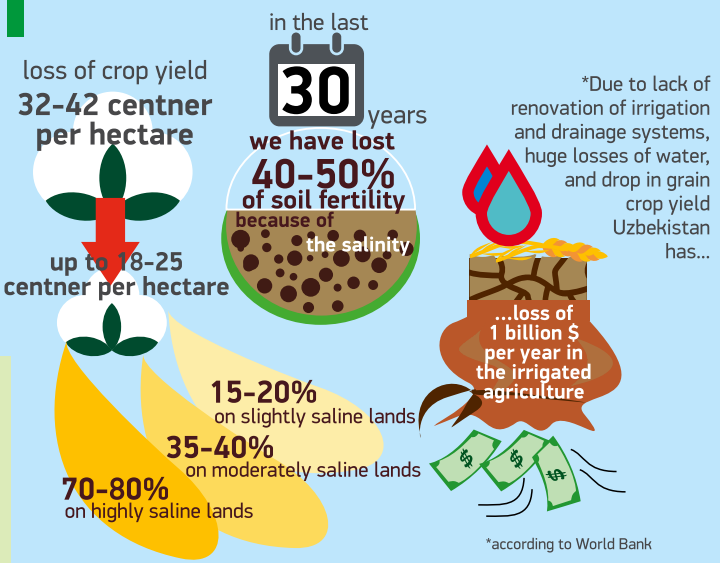


[1]Data from the National Report on the state of the environment and use of natural resources in the Republic of Uzbekistan - 2008

Causes of salinity in irrigated agriculture



Consequences of salinity

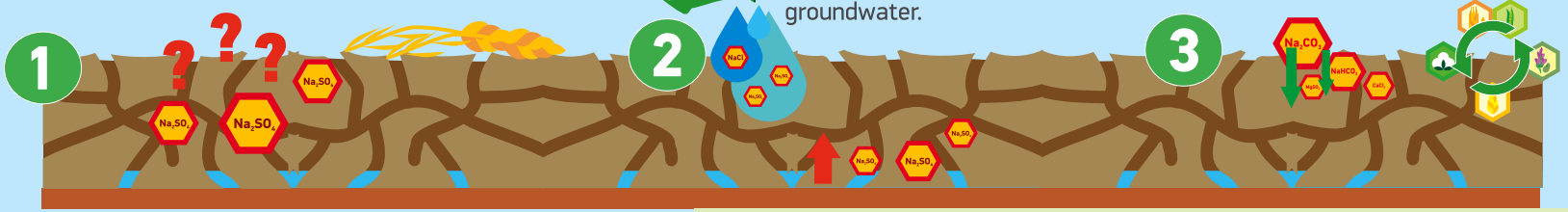


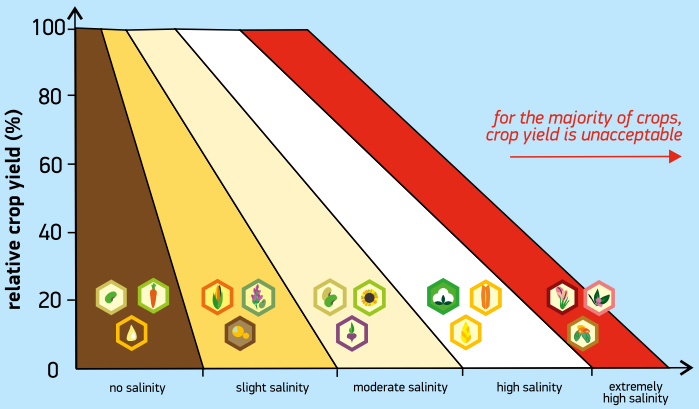
Recommendations on desalination of soils

Find out and minimize/eliminate the source of the salinity. It is important to understand where the salt comes from!

Reconsider irrigation practices, because most salt comes either from irrigation water or from groundwater.

Consider an opportunity to apply the following ways to reduce the salinity:



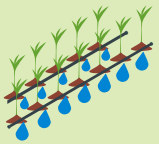


no salinity	slight salinity	moderate salinity	high salinity	extremely high salinity
mung bean (lentil)	maize	soybean	cotton	indigofera
sesamum	medick (burclover)	sunflower	triticale	licorice
carrot	chick-pea	sugar beet	barley	silverberry

source: Maas and Grattan (1999) from FAO (1985 - Annex 1. Crop salt tolerance data)

How dealing effectively with soil salinity and its consequences:

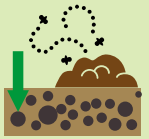
laser land leveling technology *reduces the secondary salinisation due to the decrease (up to 25 %) and the uniform distribution of washing and irrigation water on the surface of the field*



any advanced methods of irrigation that reduce the use of irrigation water, such as drip irrigation, control of the water amount, etc.

planting of successive crops with fibrous root system. *For example: peas, rye, sunflower, rapeseed.*

formation of a system of forest shelter belts (bio-drainage) along with cultivation of plants with high transpiring properties. *For Example: mulberry, poplar (populus), willow, silverberry (Elaeagnus).*



manure application *(not less than 15 tons per 1 ha)*

various drainage methods around fields

mulching

green manuring

withdrawal lands from land circulation with the purpose of their desalination via salt-tolerant crops. *For Example: indigo, licorice, silverberry.*

On salt-tolerant and restoring soil practices, please contact the GEF Small Grants Programm in Uzbekistan:

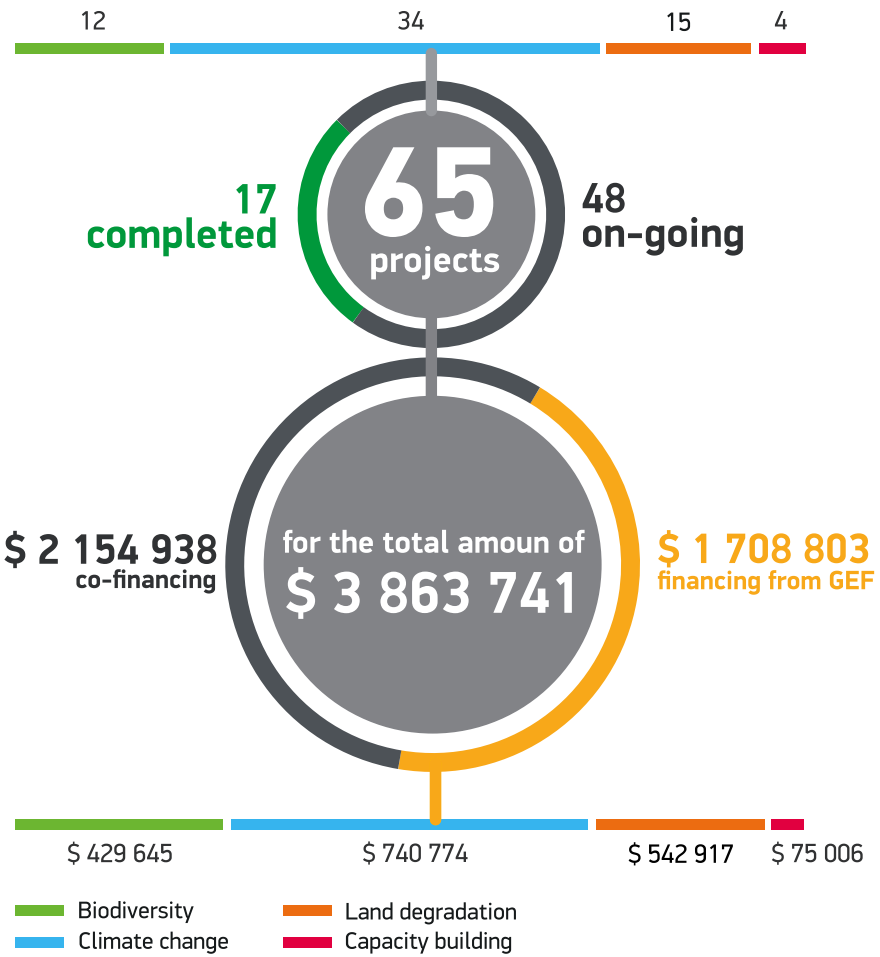
tel.: +998 71 120 34 50 (additional 145)

websites: http://water-salt.ru , http://water-salt.narod.ru , www.sgp.uz

gef SGP The GEF Small Grants Programme UNDP Uzbekistan

www.sgp.uz www.uz.undp.org

The programme in Uzbekistan was launched in 2008. Since that time 65 projects have been activated with the assistance of the GEF SGP



There are many impressive results achieved during this period:

more than **4,5 billion kW/h** are saved for citizens using "clean" technologies of energy production

39,465 thousand tons of CO_2 emissions into the atmosphere are reduced

157,560 seedlings of different kinds are planted

43.9 mln m^3 of water locals save annually and use this water for other purposes

2,402 ha of land became more healthy and fertile due to improved management

over 5,800 of people participated in the trainings and learned how to use innovative approaches and practices