The GEF Small Grants Programme
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LANDENERGYBIODIVERSITY

How to get 3 times more forage from 1 ha

Bees take service with the farmers

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GEF SGP news and events

Memo about our programme

Dear ladies and gentlemen, our friends,

I would like you to pay attention to a new issue of our newsletter, which basically focuses on enhancement of soil fertility. The issues of land degradation are very crucial in the present moment. The country's population is growing, we have limited quantity of productive lands, and unfortunately the productivity and health of the soil is decreasing. Potentially, this could threaten the food security of our country. Therefore, we should pay more attention to the conservation and improvement of soil fertility.

Our programme helps local population and demonstrates affordable, innovative solutions to existing problems with degradation of natural resources. But demonstration of technology is one thing and making it recognized and replicated as a good experience is the other thing. We make this newsletter exactly for dissemination of a good experience.

In this issue we described several ways that allow keeping our land healthy, which is a major investment of agricultural production. It is an investment. Few people think of the land, as something what requires investments. For many people it is just a resource they can use without limitation. But, unfortunately, it is not. If you do not invest in the land, it will stop producing products for our lives. Therefore, it requires investments.

We hope that our projects help people to understand this fact and start investing in soil fertility. Perhaps you, reader, will use the described technology, or help in their dissemination. We ask you to read this issue and tell others of existing opportunities. Since newsletter circulation is limited, please do not keep it - after reading it please give it to those who, in your opinion, can find it useful. The more people will know about good experience, the better and richer will be our land, and therefore people who work on it.

Good luck in all your endeavors.

Alexey Volkov
National Coordinator of the Global Environment Facility's Small Grants Program (GEF SGP) in Uzbekistan

ACQUISITION OF ADDITIONAL INCOME AND IMPROVEMENT OF LAND PRODUCTIVITY BY EXAMPLE OF PHYTOMELIORATION OF IRRIGATED LAND IN THE ARAL AREA

This article is intended to familiarize readers with the results of innovative ways to improve the land productivity using phytomelioration practice in Karakalpakstan. A farmer receives economic benefits from the sale of additional forage and additional yield (1.4 - 4 times more profit from 1 ha) and improves soil fertility (at least 0.04% of humus content per 1 season), which also have a positive impact on productivity increase in the future. We hope that agricultural workers will find the technology interesting for further use in other provinces of Uzbekistan.

Why and what for do we need this method?

The widespread cultivation of only cotton and wheat (without rotation) for a long time causes a depletion of soil and falling of yields.

After harvesting the grain crops, the land is almost not sowed and thus not protected from the summer heat and due to the high volatility it becomes saline quickly. The evaporation from the soil surface reaches 1.5-3.0 thousand m^3/ha per month and it pulls up more than 20 t/ha of salt over the summer period to the root zone when the groundwater salinity is 3 g/l.

After 1 year cotton depletes the land significantly, taking both phosphorus and nitrogen from the soil. During the cultivation of the cotton in the second year, the pressure on already depleted land is increasing.

This method will not break the requirements of sowing the main crops (cotton and wheat) and help to solve the problem of irrational use of land and water, secondary salinity and reduction of soil productivity. This soil protective system is very productive as increasing fertility, moisture saving and forage for livestock.

The essence of the method

The essence of the practice is the introduction of legumes to the current crop rotation (cotton, wheat). The methods of interim sowing of legume-cereal mixture were used in the autumn-winter period between the seeding of the main crop (cotton) and the combined seeding of lucerne, under the cover of winter wheat.

The technology should provide a continuous chain, where the soil is constantly placed under the protection of vegetation and feed it with organics in the following way:

1st year

The sowing and harvesting of the cotton. After the cotton, a legume-grass mixture is sowed. In our case, it was a mixture of triticale + winter pea, but the mixture can also be in other alternatives. The mixture enriches the soil with organics due to the growth of root system and further ploughing of crop residues, which remained after harvest of the verdurous masses in early May. The collected verdurous mass is a wonderful fodder for the livestock. Yields may be up to 100 c/ha, but in our case it was 50.7-56.1 c/ha.

2nd year

After collecting the verdurous mass in early May, once again the cotton of two-year standing is sowed. After cotton harvest in the second year, in autumn the winter wheat is sowed.

3rd year

Then in spring, the lucerne is sowed in the field with the wheat, which also enriches the soil with organics through nitrogen fixation and availability of crop residues. The Lucerne is planted in spring, in order not to inhibit the main crop (wheat). After harvesting the wheat the farmer receives two crops of lucerne, and the soil gets fixed nitrogen, organics in the form of an extensive root system and a permanent vegetation cover which reduces the moisture evaporation from the soil, as well as reduced soil salinity. And again the winter crop is sowed in winter.

4th year

Harvesting of winter crop. Harvesting of 2 lucerne crops. The Lucerne is left for the winter.

5th year

Harvesting of lucerne. The cotton is sowed and the scheme is continued from the first stage.

Description of the project results

The works were carried out in 2010-2011 in Kegeyli and Kanlykol districts of the Republic of Karakalpakstan. Since a GEF SGP project cannot last for 5 years, they used interim and intercropping crops separately on different fields with the size of 10 hectares: the sowing of legume-cereal mixture after the cotton and sowing of lucerne under the wheat cover.

Interim sowing

In the fall of 2010 the sowings of tritikale + winter peas were held. The crops wintered well and the shoots were full-grown. The availability of ramified root system has created conditions for the accumulation of moisture and winter sediments, as well as protected the soil from excessive moisture evaporation and restoration of salinization. After collecting the verdurous mass the residues are ploughed in the ground (Figure 1).

The use of «green fertilizer» in the cotton field, replenishes the reserves of soil organic matters, which is the source of soil fertility. The comparison of the check field with the field, which was sown with leg-

Figure 1. Plowing of triticale for fertilizer

ume-cereal mixture, showed that on the field with the legume-cereal mixture the contents of salt in the root zone of the soil decreased to 0.002% by chlorine-ion and to 0.04% by the dissolved solids.

The use of triticale as a green fertilizer, also allows for optimal growth and development of the cotton. The cotton after triticale by its accumulation of fruit elements exceeds the cotton state in the check field with traditional technology of cotton cultivation. Thus, the number of fruit elements on the demonstration field in early August was 11.2 units, and in the check field the figure was 10.8 units.

The demonstration and testing of interim sowing was held in 2 farms in the Republic of Karakalpakstan.

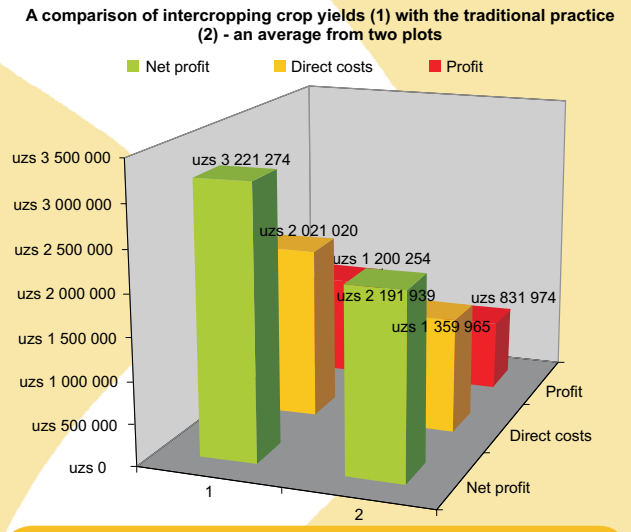
As seen from the table #1, the yield of raw cotton after plowing of green mass on average was more by 4,5-8,6% compared to the check field, where triticale was not sowed.

The project has also counted the indicators of technology profitability and its economic attractiveness. The overall economic indicators are listed in the graph #1.

As it can be seen, the profitability of the new method is at least 1.4 times higher than that of the traditional.

Intercropping sowing

The next important step in the proposed persistent system of conservation agriculture is intercropping of Lucerne with winter wheat. At that, winter wheat



Graph #1. Economic efficiency of interim sowing

was sown in fall and in spring, the lucerne seeds were sown manually through the growing wheat with the standard seeding rate of 30 kg/ha.

The plot allocated for intercropping was 20 hectares, 10 hectares were sown in each Kegeyli and Kanlykol districts. The check plots were ones with traditional sowing, i.e. winter wheat without lucerne.

In the conditions of low water level, the water-saving properties of this technology are crucial. An increase in the content of the soil organic matter leads to higher moisture-retaining power of the soil. In addition, the

Figure 2. Measurements of wheat and lucerne density

Table #1. Cotton harvesting with use of traditional and new technology

	Harvesting on the cotton field after triticale (in c/ha of raw cotton)		Harvesting in the check field with traditional treatment (in c/ha of raw cotton)	
	First harvesting	Overall harvesting	First harvesting	Overall harvesting
“Taumurat biy” farm of Kanlykol district	16.7	32.5	16.5	29.7
“Daulet” farm of Kegeyli district	17.9	31.5	18.6	30.1

Figure 3. Lucerne after harvesting the wheat

most complete cover of the soil with vegetation reduces evaporation of soil moisture, thanks to which we have been able to reduce water consumption for irrigation by 735 m^3/ha compared to conventional technology. In other words, the use of this method saves more than 7% of irrigation water.

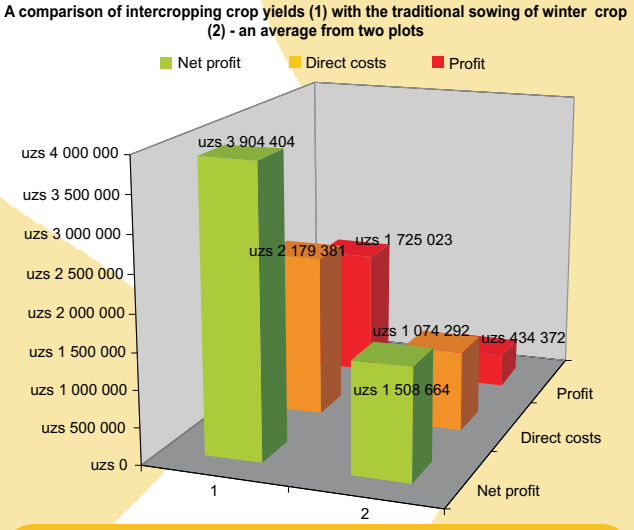
In early June, the harvesting of winter wheat was held. The yield of winter wheat was 41.2-41.5 c/ha from the fields with the intercropping, and 38.6 c/ha – from the check fields. The lucerne hay crop during the first mowing was 18.3-19.0 c/ha. After harvesting of the winter wheat the Lucerne was left for hay and one watering (in late July) was conducted, and then the second mowing of the lucerne was held. The lucerne was dried on the field and pressed for fodder. The yield of lucerne hay during the second mowing was 27.5 c/ha (Figure 4).

Figure 4. Lucerne mowing for forage after the winter crop

Low growth of the lucerne at the first mowing had no negative effect on the harvesting mechanism. The lucerne hay crop of the second mowing was higher and the overall mowing season was 46.3-47.3 c/ha.

Monitoring of the costs for growing of the winter wheat with the lucerne showed that during the intercropping the costs of growing the lucerne reduced by 182 thousand UZS/ha due to the simultaneous sowing of the lucerne with the winter wheat. The economic efficiency of the intercropping is indicated in the graph #2.

The economic analysis showed that the total income of the new method is on average four times higher (393% - in Kegeyli, and 401% - in Kanlykol districts).



Graph #2. Economic efficiency of the intercropping sowing

Conclusions and recommendations

Thus, the proposed technology of interim sowing and intercropping without breaking the requirements of planting main crops of cotton and wheat provides the following:

- receive an additional product from 1 ha of irrigated land and additional profit of 1.4-4 times more from 1 hectare compared with the traditional method of cultivation of the land;

- receive crops of fodder for livestock without additional allocation of lands;

- improve the soil fertility through enrichment with organic matter;

- the growth of the organic matter in the soil, on average by 0.04% per 1 season tends to reduce salinity and improve the moisture content of the soil;

- increase in crop yields in the future due to increase in the content of organics, reduce of soil salinization and improvement of soil moisture content.

We recommend the widespread introduction of this method in other provinces of the country.

More detailed information can be obtained on the GEF SGP website.

BEES ARE TOILERS WORKING ON INCREASING OF HARVEST IN AGRICULTURE

Many people perceive bees as insects that give honey and sometimes sting. Basically, we do not associate bees with other products or features. However, their significance in nature just like other insects' is extremely deep. Not many farmers know how important the bees are in increasing the harvest in agriculture. Below some aspects of positive and mutually beneficial neighbourhood of bees and farmers are described.

Bees should be considered as an indispensable attribute in increasing the harvest. Though the aim of our project was local - to help a little with spreading home beekeeping in Parkent district, Tashkent region, we also wanted to involve the farmers in promoting beekeeping. The reason is simple: if there is sown apiary next to a field, harvest will clearly be higher than in the case of bees not around. In many countries, farmers pay a beekeeper, so he puts his hives near fields.

The process is simple: the formation of fruit crops is not possible without pollination. There are two types of cultures - which is self-pollination (wheat, peas, potatoes, etc.) and which require cross-pollination (cotton, clover, sunflower, etc.). Cross-pollination may be artificial, with the help of wind or, more effectively - by insects. In other words, pollination by insects is an important ecological process for most oil-yielding crops, fodder and industrial crops. Pollination is also extremely important to increase yields of fruit (apricot, apple, pear, cherry, plum, peach), baccate, vegetables (cucumber, onion, cabbage, turnips, radish, etc.), as well as plants grown under cover.

«It is proven by experiments that with good agrotechnology through effective pollination of flowers by bees, crop yields can be increased significantly. For example, a fruit stands can be harvested 50-60% more, rapeseed and mustard 45-50%, buckwheat 50-55%, sainfoin, clover, lucerne, vetch 35-40% watermelons - by 100-150%. After pollination of flowers by bees seed yield of vegetable crops such as (cabbage, onions, carrots) increased significantly. It is very important that with good pollination of flowers by bees the quality of fruits and seeds improves significantly»…

Take, for example, cotton:

«Cotton's pollen is heavy and sticky, so pollination by wind is impossible. Carrying pollen from one plant to another is implemented by insects, mainly by bumble

bees and honey bees. Pollination rate decreases with increase of distance from the source of pollen. According to field research, the dissemination of pollen grains is possible at a distance of 4 km»[1].

Bee pollination should be included into the technology of cultivation of flowering crops, and beekeepers making bee pollination are paid additionally depending on quality and yield of crops pollinated, as for example, in the US, the beekeeper is paid $ 50 per hive used to pollinate an acre (hectare = 0.405). «Kashkovsky V.G. Bees and crop (V.G. Kashkovsky, N.D. Mashinskaya - Novosibirsk 2005 - 111)».

As a result of pollination by bees, yield of raw cotton (10-24%) and its quality is markedly increased. Yield increase is observed in the offspring of the first and second generations.

In addition to raising crops for sake of economy, it is also important to obtain a direct product of beekeeping - honey. Depending on the extent of irrigation and cotton varieties, with one hectare of cotton 0.5 kg to 3.5 kg of honey can be obtained in one day with one hive. On average, for 1 ha 1.2 family of bees (hives) is enough for full pollination. In fact, 20 bee hives, with 12 frames in each, continuously being nearby 10 hectares cotton field, from the flowering period at the end of July to September, brings beekeeper from 700 to 3,000 kg of pure cotton honey. The cotton variety Boyavut AN-2 is considered as the most fruitful in terms of honey in Uzbekistan.

Bees are the insects, which perform the necessary ecological functions in the agricultural landscape. Wild insect pollinators, unfortunately, do not have the acceptable conditions for survival in the human modified landscape. Processing of agriculture by man (drugs and/or chemicals, such as urea or defoliation) - is fatal for both wild insects and bees. But during processing the position of the bees can be monitored, which helps to prevent unnecessary death of insects. The farmer, of course, should inform about the upcoming processing of fields.

[1] National center of biotechnology in Kazakhstan - http://gmobase-ncb.kz/ishodnye_organizmy/hlopchatnik/

Table #2. A comparison of the yield of clover, depending on the presence of bees		
	Clover, pollinated by bees	Clover, not pollinated by bees
Seed quality	Large, heavy, full	Most are empty, light
Seed yield from 1 hectare (in kg)	57 kg	37.3 kg
Revenue from the sale of clover seed at a price of UZS 20 000 per 1 kg	UZS 1 140 000	UZS 746 000
Total additional income for farmers	**UZS 394 000**	**0**
Honey production (with all the necessary technical measures for clover), 2 kg per 1 ha per day, the beekeeper was 10 days	20 kg	0
Beekeeper's revenue for the sale of honey at a price of UZS 20 000 per 1 kg	**UZS 400 000**	**0**
Additional income for the economy of the region from 1 ha	**UZS 794 000**	**0**

As part of our project, we compared how the yield of clover and cucumber changed on the presence of bees. Identical fields were selected, with the same conditions of watering, but there was no bee pollinating in control fields and next to the demonstration field the apiary was set with 10 hives, 12 frames in each hive.

To demonstrate the yield increase of clover the clover variety - Tashkent-1 was used, which is the predominant one in Parkent area. The results are shown in Table #2.

A similar demonstration was also held for the cucumbers harvest. All data are presented in Table #3.

Conclusions and recommendations

The conclusions are simple and obvious:

- The presence of bees near agricultural fields is beneficial for the farmers;

- Increase the yield on bee pollination make up from 10 to 100% depending on the culture and cultivation conditions;

- Local authorities should support fully the work of beekeepers, besides obtaining the direct product, important for people's health - honey and other bee products, beekeepers also provide necessary services to farmers, who get additional yield.

Table #3. A comparison of the yield of cucumbers, depending on the presence of bees		
	Clover, pollinated by bees	Clover, not pollinated by bees
Quality of cucumbers	Sweet succulent	sour-sweet
Yield of cucumbers from 1 hectare (in kg)	2 600 kg	2 000 kg
Revenue from the sale of cucumbers at a price of UZS 200 per 1 kg	UZS 520 000	UZS 400 000
Total additional income for farmers (apiary was only 3 days)	**UZS 120 000**	**0**
Honey production (with all the necessary technical measures for cucumber)	300 gram in 3 days for one hive	0
Revenue from the sale for the beekeeper pollen in price of UZS 80 000 per 1 kg	**UZS 48 000**	**0**
Additional income for the economy of the region from 1 ha	**UZS 168 000**	**0**

4-FIELD CROP ROTATION OF FODDER CROPS - ALMOST 3 TIMES MORE FODDER FROM THE SAME LAND

Is it possible to get 3 times more fodder, without adding new land in circulation, and not taking away land from other crops? Yes, it is. The second question appears immediately: if so, why none does this until now? Probably, it is a problem of sharing knowledge. Farmers usually specialized on livestock and fodder, do not have reliable information on such opportunities. If you can get more yields, why not use it? After all, the land under fodder production is small, fodder is always in short supply.

The new project of the GEF SGP aims to spread the technology on more efficient use of land for production of ***fodder with simultaneous recovery of soil fertility*** and preventing further degradation. The technology is proposed to be implemented by Samarkand Agricultural Institute, in close collaboration with the district office of Payarik regional branch of Farmers Association and farm «Faizullaev A. Aziz.»

This technology has two components: 1) more fodder and 2) improving the soil. We will try to explain both components.

More fodder

More fodder is obtained through the introduction of an existing crop rotation (winter wheat, corn) ***4-field short crop rotation*** as shown in the diagram 1.

Usually farmers use rotation of cultures where 50% of wheat and 50% of corn is used. In the traditionally practiced crop rotation (control) winter wheat or barley is sown, with 40 centners per hectare (c/ha) crop capacity of winter wheat or barley, the yield of feed units from 1 hectare is 40 c/ha x 120 f.u. = 4800 f.u. When corn is grown on seed typically 40 c/ha x 134 f.u. = f.u. 5360 is received and the corresponding quantity of leafy mass is 60 kg / ha x 37 f.u. = 2220 f.u., which makes up a total of 7580 f.u. Often, after the harvest of winter wheat or barley or corn field is not sown. Thus, the compared figure (control) is - 7580 f.u.

The above 4-times field intensive crop rotation gives in a year:

1st field of 1 ha: 6000 f.u. + 8040 + 2520 + 5000 = 21 560 f.u.
2 field in 1 hectare: 11,000 + 6,000 = 17,000 f.u.;
3-hectare field B1: 18 400 + 2760 + 6300 = 27460 f.u.;
4-hectare field B1: 10 720 + 3360 + 6000 = 20080 f.u.;
Total of 4 m: 21 560 f.u.+ 17 000 f.u. + 27,460 f.u. + 20,080 f.u. = 86,100 f.u.
On average, one hectare of 4 full rotation 86100 f.u./4 ha = 21 525 f.u.

In fact, 21,525 f.u. is harvested from 1 hectare, which is 2.8 times more of the feed unit in comparison with the current fodder crop rotations (7580 f.u.). This difference is a result of raising the amount of harvest, diversifying crops and filling crop rotation with repeated and stubble crop harvesting.

A logical question from the farmer about expenses may arise. It seems that the increased number of operations will bring an increase in expenditures. To what extend income will justify expenses? The project will respond to this question, by conducting a full economic analysis of the technology. Although, it can be said with a certainty that the balance of return will be positive. So please, follow the project development.

Soil improvement

Besides, receiving additional yield, it is equally important to improve the quality of the soil and to stop its degradation. It is hard to calculate in monetary terms, but there are techniques and experiments that show how much of additional yield each score of soil bonitet gives. In fact, the more we improve the soil, the healthier the ecosystem becomes. The better and more stable yields are in the future, which means food security of the country becomes more stable.

Soil quality is improving due to the following factors:

1. The project will use technology of conservation farming or, as it is called differently, zero seed. This technology reduces the cost by 30-40%. But more importantly, this technology allows restoring the soil's micro fauna, and thus increases its fertility. The separate elements of this technology are also highlighted below;

Table #4. The area under fodder crops

In Republic (thousand ha)	**2007**	**2008**	**2009**	**2010**
The total area under fodder crops	290.0	278.5	302.5	320.4
The area under fodder crops farmers	197.4	189.5	211.9	238.3
In Samarkand region				
The total area under fodder crops	53.1	36.7	33.3	26.6
The area under fodder crops farmers	39.2	21.5	18.7	15.0

Source: Agriculture in Uzbekistan, statistical collection. Tashkent 2011.

Diagram #1. Cyclical 4 times full crop rotation

2. Mulching of crop residues enables to restore the soil organics, increasing concentration of humus and useful microorganisms in the soil, improving the soil structure;

3. Technology is set that the soil is always covered with green cover, which creates shading, reduces heating of the soil, and decreases ascending stream of mineralized groundwater. Weakened heating also increases the descending current, which allows irrigation water to wash away salt inside, which contributes to soil desalinization from harmful salt and correspondingly reduces the consumption of water for irrigation. The same principle of regular shading of the soil surface was used by us in the project on phytomelioration in Karakalpakstan (see article above);

4. Laser land leveling in addition to preserving water also helps to prevent the accumulation of salt in the soil;

5. The use of legume-cereal mixture in rotation, which is branched and has densely woven root system, allows accumulating root residues in the topsoil, which enriches the soil with organic matter;

6. The same root residues create conditions for better moisture accumulation and storage of winter precipitation, as a good protection against wind and water erosion. The accumulation of these residues improves water and physical properties of the soil in the root zone, protecting from excessive moisture evaporation and salinity;

7. The use of legumes can increase accumulation of atmospheric nitrogen by legume bacteria that also help improving soil fertility.

In addition, this technology is important in terms of reducing greenhouse gas emissions in the atmosphere from processing of soil (nitrous oxide) and can serve as a good technological adaptation of farmers to coming aridity and water scarcity, due to its moisture saving properties.

So what happens?

The project has just started, but expectations are already high. We believe and hope that our expectations will be met, that this technology:

- Will preserve, restore and enhance the fertility of soils and protect them from wind and water erosion in the future;

- Increase the output/productivity of one irrigated hectare by producing fodder necessary for livestock;

- Will reduce the cost of feed due to many factors (savings of irrigation water, fuel and lubricant materials, and economy on scale).

Final results will be seen after completion of the project. But now we can say that this is good, a strategically important technology, which requires special attention and, if it the positive results in Samarkand region are achieved, to spread it in the whole country.

GEF SGP is willing to help in disseminating this technology in other provinces of Uzbekistan.

FOREST BELTS AS A FACTOR OF ENHANCEMENT OF THE LAND FERTILITY AND CROP CAPACITY

E.K.Botman, Candidate of agricultural sciences, RRC DGF

Is there any way to increase the productivity of irrigated lands to 15-20% without significant investments? Yes, there is.

Is there any way to keep the fertile topsoil for maintaining the productivity and for food security in the country? Yes, there is.

Agriculture is a significant part in the economy of Uzbekistan. The foundation of agriculture and, consequently, of the food security of the country is irrigated agriculture. However, irrigated tillage in the arid zone is an artificial ecosystem, which is not capable of self-regulation to maintain a constant level of soil fertility and therefore needs in environmentally substantiated management decisions.

The problem

The major factor of the loss of topsoil layer and land productivity is wind erosion. We should know and be able to prevent two important negative features of winds:

1. The air/wind temperature is not important, but if strong wind blows in spring after tillage, it quickly dries the soil disturbed by tillage. The structure of plowed soil is changing after its dehydration, there appear fine-dispersed particles that rise from the surface by the wind. The blowing is happening together with the loss of the upper, most fertile soil layer. The same thing could happen to plowed land after harvesting of crops in summer - fields uncovered with vegetative cover after wheat harvest, are also exposed to the hot wind and a loss/blowing of fertile topsoil is taking place.

The system of forest belts for protection of agricultural fields

Forest belts protect cotton

2. Summer wind at low humidity and high temperature is harmful to crops in other way. For example, the cotton can lose its fruit elements during the hot dry wind, i.e. buds, flowers, young ovaries. Clearly, this is a definite loss of crop. Because of these winds grains become broken winded, i.e. grains would be incomplete.

More than 65% of irrigated lands in the country are subject to varying degrees of wind erosion. Over recent years the content of humus in the soil decreased by 30 - 50%. About 40% of all irrigated land is occupied by soils with very low content of humus (1.0%). As a result more of irrigated lands become out of agricultural use because of reclamation status.

Solutions

One of the best approaches to combat wind erosion and improve the microclimate of the fields is the development of systems of forest shelter belts.

The name speaks for itself - «forest shelter belts,» i.e. belts consisting of several rows of trees and bushes that protect fields. Forest belts reduce wind speed in interbelt space, i.e. on the protected fields. Reduction of the speed of wind affects all other microclimatic parameters of the territory – air humidity, temperature of air and soil, etc.

Forest belts on the irrigated land (as well as on the arid ones) have several advantages, including:

1. They increase crop yield - Yield increase up to 15-20%, and the quality of the harvest also increases, in particular the length of the fiber. It happens due

to improvement of the microclimate on the protected fields:

- decrease in wind speed reaches 38-34%, which leads to an increase in moisture of the surface air up to 5-9%;

- lowering of summer air temperature up to 1 °C, and the temperature of the soil up to 1,2 °C;

- water stress reduction, improved moisture content in the soil and reduced temperatures create more favorable conditions for soil microorganisms, improving soil fertility and thereby providing favorable conditions for the growth and development of agricultural crops.

2. Stop losing the fertile topsoil - Reduced wind speed on the protected fields leads to the termination or significant reduction of soil erosion, i.e. stops blowing of the fertile topsoil.

These “alive” giants are able to fulfill their duty even during winter

3. Control of the level of mineralized groundwater – In summer crowns of trees evaporate a lot of water, pumped from the ground, through the leaves. The trees act as a pump, pumping ground water with the roots and evaporating by its foliage. It is a kind of biological drainage, which lowers the level of the mineralized soil water, and therefore reduces the risk of secondary soil salinization. It is a very important property considering that more than half of the irrigated lands in this country are subject to secondary salinization due to the high groundwater level.

These are the main advantages of belts that are important to farmers. There are plenty of additional qualities that speak in favor of shelter belts, namely:

Cleaning of the air – Tree plantings keep a lot of dust suspended in the air by the leaves, thus purifying it. In addition, most of the trees, poplars in particular, secrete volatile productions from their foliage and thus kill pathogens;

Aesthetics – Forest stands diversify the monotonous landscape of agricultural fields, greatly enhancing its aesthetic appeal;

A place to stay – Often forest stands in the oasis are the only place suitable for recreation of the local population;

Habitat for wildlife – Forest stands are often the only safe asylum for wildlife in the monotonous landscape of agricultural fields, a hotbed of natural biodiversity (birds, insects, small mammals, etc.). It is known from the science of that the more diverse an ecosystem is, the more stable it is;

Carbon absorbent – The trees are nourished by carbon, absorbing carbon dioxide from the atmosphere. They, thus, help to regulate the global climate system. Calculations show that 1 ha of forest plantations annually consumes about 4.48 tons of carbon, which corresponds to 16.43 tonnes of CO_2 from 1 hectare per year. With an average lifetime of forest stands as 30 years, the potential of carbon adsorbing into protective plantations on irrigated land in Uzbekistan can be estimated as 16.43 tons x 30 years = 492.9 tons of CO_2;

Source of wood – Despite of the fact that forest plantations in irrigated areas are intended primarily for protective functions, however, they have their own life cycle and after which they are subject to the cutting, pulling and renewal. By that time they accumulate substantial timber (500-600 m^3/ha), both for business and as wood. With the significant shortage and high prices for the wood this function should also be counted;

Other purposes – Besides forest stands in rural areas other types of forest plantations could be created to increase the roughness of the surface, and thus improve the microclimate and environment of residents. For example, it can be specialized forest plantations (mulberry tree - for feeding silkworms, poplar and other fast-growing species - for timber and landscaping plantings in communities, etc.).

How to create field-protective forest stands?

A range of available technologies have been developed for creation of field-protective forest stands. Few basic principles should be kept in mind to create these belts:

1. It is important that it is not one or two stands on the edges of the field but *a system of interacting stands*. The system of field-protective belt means full coverage of certain area with forest stands (with 1-4 rows) in a certain distance from each other so that windabating effect of one belt is overlaid by the effect of the other.

2. Belts should be perpendicular to the main harmful winds and these belts are called basic. But, due to the fact that the wind often changes direc-

tion, there should be supporting belts which provide protection from the winds of other directions. Thus, the belts system looks like cells in the form of rectangles (see photo below), the longest side of which are the main belts, and the short ones are secondary belts.

3. Researchers have identified that the higher the stands are, the more their range of influence is extended, that is, shelter belts have to be created out of long-boled species (poplar, sycamore, elm, ash, willow, etc.) for the minimum land acquisition of the shelterbelts. The connection between the height of the belts with the range of its influence has been found out. It is believed that this range is equal with approximately of 20-25 multiple of the belt height (H), i.e., distance between strips should be 20-25H, where H - the height of the belt in meters.

4. The structure is formed by selection of trees and shrubs and their placement in the belt - dense, delicate or permeable. The construction, as well as the height of the belt, determines the range of its influence, and some other characteristics of its functional features. Scientific researchers have determined that for the full protection of the plowed field by the system of shelter belts it is enough to allot about 3% of the area, partly forest belts will be located in the areas of irrigation and drainage and road network, i.e. it will not occupy a productive farmland.

Findings

In 70 - 80 years of the last century there were about 40 hectares of shelter belts in Uzbekistan. Now they are almost gone. Unfortunately, in recent years new systems of shelter belts have not been created, and the old ones became out of order due to aging and cutting.

We have no forest stands, the soil fertility has greatly decreased. Of course, we do not claim that the lack of shelter belts is the main factor in the loss of soil fertility. There is no one main factor. It is a complex of factors. And the lack of shelter belts is one of the important components of the loss of fertility.

Therefore,

a. It is required to transform the agricultural landscape - only fields (what we have now) into forest agricultural one (with shelter belts and other plantings of various functional purpose).

b. It is required that the farmers themselves will initiate a system of forest belts on their lands, not just the state. Then it will be the largest and most effective stimulus to the creation of such belts.

c. It is required that local government authorities will support the initiatives of the farmers to create systems of belts. Many farmers think they are not allowed to dispose the land for forest belts - the entire land should go for plantings. As it was stated above, no more than 3% of the land in the borders of fields is required for the shelter belts. But instead, the farmers will get 15-20% of increase in the yield on a protected field. And most importantly - soil fertility is maintained for future crops. That is the most important aspect.

Population growth and objectives for improving their life, food security require investments in the maintenance and improvement of soil fertility. The revival of forest stands in the country is leading to the stabilization of the soil fertility of irrigated lands and its quality improvement.

Global Environment Facility's Small Grants Programme (GEF SGP) in Uzbekistan is ready to support the initiatives of districts or provinces to rebuild systems of shelter belts on arable lands. For questions or suggestions, please write to e-mail alexey.volkov@undp.org or by phone: + 998 71 120 34 62 (office) or + 998 93 381 00 82 (mobile).

The seminars for farmers in Namangan and Kashkadarya provinces on laser planning of the fields

On November 20, 2012, a training workshop was conducted in Mingbulak district of Namangan region for the farmers of this and the neighboring districts. The farmers were told in detail about the laser planning of lands as an effective way to combat land degradation, about saving of water and increase of crop yields. The seminar was organized by Namangan Institute of Engineering and Technology, which is the main partner of this project.

On November 28, 2012 a similar training workshop was held in Kashkadarya. The farmers from six regional districts participated in this workshop, where GEF SGP in collaboration with UNDP project on climate risk management will transfer 12 sets of laser planners. The workshop was held in Karshi.

Oybek Egamberdiev from NGO KRASS, Khorezm province, was the main expert on this technology. NGO KRASS (www.krass.uz) is one of the initiators of the dissemination of this technology across the country with the support of the GEF SGP.

Currently the projects on laser planning were conducted in Khorezm, Namangan, Kashkadarya regions and Karakalpakstan. If there are initiators (khokimiyats, Farmers Council, Water Users Association, institutions and others) on dissemination of this technology among farmers in other provinces of the country, the GEF SGP is ready to support this initiative. To get information on the terms of grant allocation, visit our website - www.sgp.uz, in the «Procedures» section.

Biogas for greenhouses

The GEF SGP continues to disseminate the technology of biogas production and its use for the needs of the country. Currently, the GEF SGP helps in implementation of two projects on biogas - one in Namangan province, the second - in Tashkent region. Both projects are aimed to demonstrate the production and use of biogas to power the greenhouses.

The project which is executed in Tashkent region on the initiative of the Institute of vegetable, potato and watermelon cultures, with the financial support of the GEF SGP, UNDP (Project «Business Forum of Uzbekistan»), and the Korea Development Agency (KOICA), in partnership with the Chamber of Commerce in Uzbekistan.

The project will construct four types of greenhouses similar in size and biogas installation, which will supply these greenhouses with biogas. The project will detect the amount of gas required for heating each type of the greenhouse. This project is aimed to calculate precisely how the use of biogas is cost-effective for heating the greenhouses, which of the greenhouses are more profitable to construct in terms of gas consumption and other indicators, and to provide to-be-received recommendations with the pros and cons to the farmers engaged in the sphere of greenhouse facilities.

The project in Namangan is designed to demonstrate biogas technology to the farmers in the province. The project provides for creation of biogas installation in one of the farms («Ulugbeklar» farm) of Turakurgan district, Namangan province. Production of biogas in the village from animal waste will:

- provide natural gas and for the greenhouse of «Ulugbeklar» farm and nearby school № 8;
- ensure the production of high-quality organic fertilizer;

- disseminate instructions on construction of biogas installation among local people, farmers and entrepreneurs of Namangan province.

An initiative group from Namangan Engineering and Technology helps to implement the project.

Both projects demonstrate to farmers that this biogas technology:

- can supply greenhouse and other agricultural infrastructure/manufacturing facilities with gas and electricity;

- helps to reduce the consumption of wood, and thus deforestation in Uzbekistan;

- helps to reduce the consumption of coal and other hydrocarbons;

- allows to produce excellent fertilizers which increase land productivity;

- reduce greenhouse gas emissions;

- most importantly, it ensures the stability and reliability of power supply, which can be one of the key factors in production development in rural areas.

Passive greenhouses

2 projects on passive greenhouses have been launched. Passive greenhouses are energy efficient ones with little or complete absence of heating, which:

- Have clay (adobe) walls on three sides of the greenhouse, which significantly reduce the loss of heat;

- One film side of the greenhouse is directed to the south, thus maximizing receipt of the solar heat;

- The film side of the greenhouse is closed at night with thermal blanket, made of any good insulating material, thus saving the heat accumulated during the day.

This design allows to organize the production of vegetables in the greenhouses in the conditions of the shortage of energy resources.

One of the projects is building one demonstration greenhouse in each of 8 provinces of the country with the support of the Chamber of Trade and Commerce of Uzbekistan, and with the financial support from the United Nations Development Programme (UNDP). The second project in Khorezm province, in close cooperation with Urgench State University and the UNDP project and the Ministry of Economy of the Republic of Uzbekistan “Supporting Uzbekistan in Transition to a Low Carbon-Emission Development Course”.

For more information about the projects, visit our website - www.sgp.uz

Cheetahs will run through the expanses of Uzbekistan

One more project has been launched with our old friend, Ecocenter Djeyran. The new project aims to restore in Uzbekistan a beautiful and elegant predator

Photo by Andrey Timchenko

- the cheetah. This great animal lived in the expanses of our country, but it was completely exterminated. The GEF SGP, in collaboration with WWF Russia, is helping the Ecocenter to start the first stage on reintroduction of the cheetah in Uzbekistan. We hope that in the spring of 2013 first cheetahs will come to Uzbekistan.

Database of Uzbekistan plants using GIS technology

Plants is an important resource for the country's economy. It is important for the planning of the various sectors of the economy to know where, how many and what plants we have in our country. It could be fodder plants on natural pastures, and woody plants, or herbals.

Institute of the gene pool of the flora and fauna of the Republic of Uzbekistan is intended to answer the above questions. The new project will help to create a database with the use of geoinformation systems (GIS). In fact, when the database is available - and it will be available to everybody - any user can retrieve information about the plants of the country, with the visual mapping support showing the territory of placement of certain plant species.

For more details of the project please visit our website www.sgp.uz

Pistachio in Fergana Valley

We continue to spread the technology of the industrial pistachio plantations. Currently this work is carried out in Fergana Valley. 2 projects are being prepared in Fergana and Andijan which will set up demonstration plantations.

A model plantation and breeding center of varietal pistachio, which will supply planting and inoculative material to the entire Fergana Valley is planned to be created in Andijan province.

Plantations on the pebble slopes are planned to be created in Fergana province, demonstrating the use of this kind of unproductive land with the help of the technology of economical irrigation. Most probably, with the help of drip irrigation.

Life-saving of Saiga with a help of business

Currently, a project on reducing poaching on saiga in Ustyurt plateau is being developed. The saiga is one of the most endangered species in the world, which has lost 95% of its population over the last 20 years.

Photo from http://givotnie.com

The project proposes to create a business scheme where local women will be involved in the business of manufacturing products with traditional embroidery, which will be exported and sold in the zoos all around the world. It is assumed that it will become an important source of income for families in the Ustyurt, where employment rate and income is very low. In exchange for involvement in this business, family members should completely go out of the business which is somehow related to extermination of the saiga or selling of its products (meat, horns). We hope that this business scheme will contribute to relief of pressure on Uzbek population of saiga through the welfare of the local population.

Microhydrostation is serving the business in Fergana Valley

Currently 2 projects for the construction and operation of microhydrostation are developing in Fergana and Andijan.

The project in Fergana province is planning to build microhydrostation with power of 25 kW, which will provide stable energy to 2 mini workshops (a cotton hackling workshop and a rice mill) and local ambulance in Ok Machit mahalla of Uzbekistan district. Stable electricity will allow to develop mini production shops in the village and to provide people with health care.

The project in Andijan province has strategic value. The existing facilities of one company in Andijan for production of micro hydro power turbines should be in high demand among consumers. The project will help to provide a to-be-built microhydrostation of 100 kW with a certified current generator. The produced current will feed the neighbouring settlement through a separate feeder. Since sale of current to the population is allowed only to SJC Uzbekenergo, the micro hydrostation will sell energy to the state monopoly by wholesale price, which, in turn, through its network will feed the population with current according to the existing rates.

The production of the certified current will let the independent producer to sell current to the network. In fact, the project will demonstrate the scheme, which can be replicated anywhere in the country. Under this scheme, the current is not only produced on small streams and supplies energy only to individual producer who has built a microhydrostation but it is legally sold to people through the existing network. This is the first step that may help to create a market of independent producers of alternative energy.

BRIEFLY ABOUT THE PROGRAMME

The Global Environment Facility's Small Grants Programme (GEF SGP) operates in Uzbekistan for nature conservation in our country for future generations through the introduction of innovative technologies that help to use the land, water, energy and other types of the natural capital in our country more rationally.

The GEF SGP provides free financial support for such technologies. Grants are awarded on certain conditions, which you can find on our website - www.sgp.uz in the «Procedures» section - «Project development» On our site you can also get familiarized with the projects that have been completed or are in operation at present. We should say from the very beginning that we welcome the dissemination of successful practices that have already been approved by the GEF SGP projects in other provinces. Our working principle is that we can replicate a successful technology once in each area. What does this mean? For example, in Khorezm we had a project on training the farmers the technology of laser leveling of fields for water saving and gaining additional yield. The project was very successful. Now, if people from another province come to us with the proposal to implement the same project, we will agree with a pleasure, account our criteria and gained experience. For example, we already supported projects on laser levelling in Namangan, Kashkadarya and Karakalpakstan. This is being done in order to provide people of each region with the opportunity to observe and learn the best practices in their own area, without going to Khorezm. Many of them cannot or would not wish to go to other province. This will limit the spread of such practices. But if the farmers from Khorezm come to us asking to repeat the same project, we will have to reject it, because this type of project already exists in Khorezm, and all the residents of Khorezm can become familiarized with it without leaving the area.

Our objective is to show what technologies can be used for nature conservation, as well as what benefits they give... But we cannot and should not help everyone who wants to launch them. We help only the first pioneers who are take the risk. We help to demonstrate that «Yes, this technology works» or does not work, and share this experience. Then others will have to implement such technologies on their own, if they consider them attractive. We can teach how to «fish», and not to provide the «fish» itself. [2]

Therefore, we will be glad if you apply to the GEF SGP with proposals to introduce any innovative technologies that can save and/or carefully use energy, land, water, wildlife and other natural resources of our country or with the methods that you propose, or with the old fashioned ones, or the methods that someone has tested in other provinces of the country or even abroad. Please, feel free to apply.

All the contact information is on our website - www.sgp.uz

[2] There is an old Chinese proverb: "If you feed a hungry man with fish then he will be full for the day. But if you train him to fish you will feed him for the rest of his life"

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