of water, increasing crop yield improvements in technology have causedless ... process and technical means for its implementation.

We have developed a number of technologies and equipment for conservation tillage: a combined front plow with crop residues and shredders subsoiler, plow-ripper with shredders residues and without crushers, as well as with subsoiler (track cut blazers) based front-end plow, plow, trencher with working body type "glider". By plows and plow-rippers are designed serrated ploughshare and bolts rippers.

The technology of conservation tillage provides processing fields with a turnover of layers within its own furrow in 180°, and without recourse layers [4]. This strip, treated with a turnover of layers, will alternate with strips treated without recourse seams, and that changes every year rotation. This tillage is carried out without recourse layers to a greater depth than the turnover of soil layers. As a result, the bottom of a cultivated field is obtained step that allows the accumulation of soil moisture and eliminate intersoil erosion. In addition, moldboardless processing to a greater depth compared to the dump requires significantly less energy.

Funded moisture on mold machined parts, absorbing part of the band with a turnover of layers, reduces the density of the soil plow sole. Alternating bands of traffic and no traffic seams increase wind resistance surface of the field. This technology is carried by plow-ripper, which consists of the front plow installed corps, traffic layers within its own groove, loosening working bodies with sloping uprights and loosening, leveling roller. This plow body is established by the middle of the machine, is loosening the working bodies of the left and right sides.

Preliminary testing of mold on the base of the front plow SFI-2 with active working bodies and without them in Kamashi area of Kashkadarya region have shown their high efficiency. Performance of the unit with the covers dumps was by 15-18% more than the moldboard. The degree of mold in the process is not less, and in some cases even more (especially at high speeds) than the moldboard. After the passage of the unit without inverting the soil surface remained with 71-74% of plant residues. This is a major factor in increasing resistance to erosion of soil by using this technology.

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MODELLING OF WATER BALANCE IN THE SUB CATCHMENT AREA SASIV (WESTERN BUG)

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Water related problems currently have serious impacts on the health of people in all regions of the world. Climate and global change will intensify these problems. Therefore the International Water Research Alliance Saxony (IWAS) focus on solving water resource management problems as access to safe drinking water, sewage treatment, agricultural irrigation, extreme occurrences and their processes. They develop concepts for five hydrologically sensitive regions of the world namely Ukraine, Mongolia, Brazil, Vietnam, Oman and Saudi Arabia. Within the Ukrainian project the catchment of the Western Bug is investigated. The river is a tributary of the Vistula River and it is of great importance because it is crossing the border of the European Union. The streams of Bug and Vistula are shown in Figure 1. Other reasons why dealing with the Western Bug are the bad river water quality and the insufficient and outdated water infrastructure. Therefore the main goal is to develop a concept for efficient improvement of surface water quality, which is in accordance with international standards like the EU Water Framework Directive. An essential requirement for integrated river basin management is the estimation of water supply and balance. Thus this study deals with the modelling of water balance in a sub catchment of the Western Bug River.

Figure 1. Catchment of Bug and Vistula
(http://www.iwas-sachsen.ufz.de)

PERSPECTIVE DIRECTIONS OF DEVELOPMENT OF NEW SOIL CULTIVATION MACHINES AGAINST SOIL EROSION

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Set by the Government of the Republic of Uzbekistan tasks for improving soil fertility and sustainable increases in agricultural production on the basis of scientific and technological progress and wide application of intensive technologies, makes the further intensification of agriculture, and consequently, increased anthropogenic impact on soil. The lack of scientific validity of the intensification of tillage, especially on rain-fed lands, leads to increased water and mechanical-technological erosion, spraying of the upper and lower layers of soil compaction, reducing its water-keeping ability.

Recent erosion, especially wind, desiccation of the Aral Sea has caused considerable damage to agriculture, the economy of Uzbekistan respectively. In general, in Uzbekistan today more than 70% of the cultivated area in varying degrees is susceptible to wind and water erosion.

Strong degree of wind erosion of exposed soil of the desert zone of Uzbekistan, which includes the territory of Central Fergana, Syr Darya, Jizzakh, Kashkadarya, Surkhandarya, Bukhara region. This is mainly grassland soils. But much of the deserts are takyr gray-brown, sandy desert soil types. All of them are marginal and deflationary processes that are highly developed, further reducing their productivity. Because of wind activity in individual farms in the territories crop yields are sharply reduced [1]. The zone of strong wind blowing repeatedly led to worsen the mechanical structure and a sharp decrease of humus, nitrogen and phosphorus in the soil. In this regard, the protection of soil from deflation processes is important for improving soil fertility.

Today, more than 90% of the cultivated area of land is subject to the slopes in varying degrees of water erosion. In recent years water erosion on sloping lands has caused considerable damage to agriculture. Water erosion is most affected irrigated lands. Water erosion are destroys part of the fertile soil and accelerates the soil drought, which resulted in the soil los its structure, becoming scattered and worsening its permeability.

In Uzbekistan, over 20% of arable land is situated on the slopes of 30 or more degrees. At high plowed and increasing intensification of agriculture area eroded land on the slopes is increasing from year to year. The problem of water erosion and soil moisture deficiency is keenly felt at the rainfed sloping lands. In [illegible] suitable to dryland soils are 2 million 130 thousand hectares. Of arable land [illegible] 115 thousand hectares. According to scientists of Tashkent State A[illegible] University 700.4 thousand hectares of arable land non-irrigated soils are [illegible] water erosion, of which 416.5 hectares are of strong and moderate erosive [1].

The [illegible] "average soil erosion" a 3-7 times higher than naturally allowable: 2-3 [illegible]. Soil erosion reduces the moisture reserves in the soil and leads to [illegible] of the soil. The yield of crops decreased from 10-15% on weak and up to 40 [illegible] on washed soils [2].

The most important activities for the prevention of soil erosion include tillage and technical means. But the technologies and tools for soil cultivation before [illegible] in Uzbekistan not only prevents but also contributes to the emergence and development of processes of erosion, since the existing system of farming does not provide for measures to prevent soil erosion.

The choice of tillage and appropriate tillage machines is driven by, first of all, soil and climatic conditions.

Currently, the most widespread in our country are emulsion-dumping plows: they handle more than 90% of arable land. Major shortcomings should include high energy process of plowing, inappropriate use in conditions of insufficient moisture, and in soils prone to wind erosion, the possibility of formation of a plow "soles".

Plow treatment is unacceptable to the drylands, for unstructured, dry, poorly protected by vegetation soils, in terms of frequent winds, i.e., in areas where the soil is exposed to wind erosion. It's necessary to rejec autumn plowing and expedient processing of soil without recourse to the persistence layer of stubble.

In Europe and the U.S. fairly widespread as tools for primary tillage are chisel plow. Tests for chisel plow, conducted in Ukraine [1] showed that compared with the emulsion-Dumping its performance at 12-17% higher specific resistance and fuel consumption is by 17-19% lower. According to American scientists discussed above implements used for soil treatment, cost per hectare treated the following number of fuel: 16.39 depleted plow, disc harrow 7.77 and chisel plow 7.43 l/ha. [2].

According to information from the working group on agricultural mechanization UN [3] working bodies of the chisel plow can serve subsoiler, efficiency chisel plow higher than the emulsion-Dumping and energy consumption is 0.67 on energy consumption emulsion-moldboard plow, but that often requires repeated treatment, which require less energy than the first one.

However moldboardless processing, along with positive aspects, has its drawbacks: not provided effective control of weeds which leads to obstruction of fields; accumulates structureless soil surface, which ultimately dramatically reduces its resistance to erosion. The need to protect soil from wind and water erosion, reduction of energy costs for processing, better storage and conservation waters. It also supports about 21 WUAs in some regions in [illegible] assistance, training and improvement grant of US$1 [illegible]/ha

- The ADB funded "*Improvement of Grain Crops Productivity*" project (US$26m, 2004-2009) promotes wheat production in three regions to boost farm incomes. It will benefit WUAs there in two ways: [illegible] agricultural machines (such as bulldozers, excavators, trailers and tractors), and rehabilitation of on-farm irrigation systems. The example of Sayram Suvi WUA in the following sections is among the WUAs supported under this ADB project.

Conclusions

WUA development is an integral step in the reforms of irrigation management transfer that is underway in Uzbekistan. With half a decade passed since the initial reform, a number of lessons can be learnt:

1. Financing for system rehabilitation to make irrigation networks reasonably functional has played a critical role in increasing farm productivity and thus farmer income. This forms a foundation for adequate ISF collection and subsequently the surviving of WUA. The availability of important agricultural machineries and canal cleaning equipment, as a part of the above rehabilitation and investment effort, contribute to creating a good environment for profitable agriculture production and farm productivity and to reduced burden on expenditures of WUA.
2. The establishment of a full cost recovery ISF, including varying fees for water-consuming crops, is commendable.
3. Training to farmers and WUA should be an integral part of WUA development.

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CONTENT

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