MINISTRY OF AGRICULTURE AND ENVIRONMENTAL PROTECTION OF TURKMENISTAN

TURKMEN AGRICULTURAL UNIVERSITY NAMED AFTER S.A. NYYAZOV

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STRUCTURE OF INTERNAL ECONOMIC PLAN FOR WATER USE

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The manual for water users

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In the scientific production manual there are many information about the quality of water services in our country, the importance of the internal economic plan (including the current water management plan for the crop), content and conducting and putting in production. The manual outlines some of the issues in the plan using simple examples.

The manual also provides tips and suggestions to water users on the proper use of irrigation in the agricultural sector.

The manual is intended for professionals working in various positions in the water industry, hydro meliorates, landowners, farmers and tenants.

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INTRODUCTION

Our independent, permanent Neutral Turkmenistan has huge land resources, but its water resources are limited. The annual population growth in our country is leading to a year-on-year decline in the per capita water supply in the country due to limited water resources. Due to climate change, the demand for additional water sources in our country is increasing as the water demand of crops and the evaporation of water from the soil increase.

The majority of the population of our country lives in the village. The socio-economic situation of the villagers depends to a large extent on the income from irrigated agriculture. The profitability of this sector is due to the efficient use of water resources.

Efficient use of water is said to increase water losses and the harmful effects of irrigation on the environment as much as possible, while maintaining a balanced production relationship between water users and obtaining high yields at low cost per unit of water used in agriculture. As can be seen from this definition, the issue of efficient use of water is inextricably linked to economic, environmental and social issues of the household. For this reason, the water use plan serves as a basis for the production and financial planning of households every year.

Article 53 of the Water Code of Turkmenistan guarantees the right of households to plan water use in agriculture. According to this law, the water supply of the lands is determined by the area of irrigated lands, the types of crops planted and the local soil and climatic conditions.

Fully taking into account the local climatic conditions in the water supply of households is a complex issue. This requires information such as the highest and lowest temperatures of the day and night, the humidity of the air, the amount of precipitation, the speed of the wind and the indicators of solar radiation.

According to international experience, small meteorological stations are being set up within the farms to collect this information. The introduction of such an experience into production is being carried out in our country in the framework of projects implemented in conjunction with the United Nations Development Program.

According to the results of the Intergovernmental Panel on Climate Change, the average global temperature will rise from 1.8 to 4.60C by the end of this century.

Even today, it has been reported that droughts and changes in the amount and frequency of rainfall are occurring in the Central Asian region [3]. As climate change has an impact on the environment, the economy and various aspects of society, there is a need to develop adaptive measures against it. One of those measures is to develop an in-house water use plan in accordance with changing weather conditions.

The purpose of this guide is to teach water industry experts and farmers how to develop and implement water use plans, how to set them up at the farm level, how to set water requirements for agricultural crops, and how to determine the water requirements for agricultural crops.

All of the activities suggested in the manual are based on the economic scale of the water. The irrigation system belongs to the technical system. The principle of measurement, which is specific to any technical system, also applies to the domestic irrigation system. In this regard, it is not possible to develop and implement an internal economic plan for water use without irrigation water accounting and reporting at the economic level.

The need for an internal economic plan for water use in the efficient use of limited water resources

In Turkmenistan, a lot of money is spent from the state budget to bring irrigation water from water sources to crops. Thus water, which is a product of nature, becomes an economic commodity because it absorbs human labor**.** In such a case, the efficient use of water requires the use of scientifically sound approaches.

In order to make efficient use of our limited water resources in changing climatic conditions, the authorized state body establishes and monitors the limited amount of water consumption to water users in accordance with Article 12 (11) of the Water Code of Turkmenistan**.**

The purpose of the monitoring is to evaluate the quality of water services performed for the effective use of a limited amount of water.

As a result of the monitoring, measures are being taken to ensure the efficient use of limited water. One of the most important of these measures is the implementation of an internal water use plan.

According to international experience, the UN Food and Agriculture Organization (FAO) recommend the use of four indicators in assessing the quality of water services. They have the fairness, reliability, flexibility and scalability of water services. There is a computer program developed specifically by the FAO to determine these indicators [8]. It can be found at *http://www.itrc.org/papers/papersindex.html*. But for now, we think it's enough to focus on the content of these indicators.

The fact that the quality of water services provided to water users is equal for all demonstrates the fairness of water services. That is to say, no matter how much the water supply is, the water users at the foot and foot of the canals or canals enjoy the same water services. The fairness of water services is a key indicator because it summarizes other indicators. Because it is clear to everyone that where there is no reliability, flexibility and dimensionality, there will be no justice.

Preliminary water supply data of the water source, satisfactory state of the technical condition of the main canals, inter-household and domestic irrigation systems, and the professionalism of the water workers ensure the reliability of water services. When the water service is reliable, water users will have a strong belief that the water share will be paid in due course. The reliability of water services is strengthened on a contractual basis.

The water contract must also clearly state the responsibility of the water supplier and the water user for violating the terms of the contract. The ability of water resources to be distributed among its users even in the event of a change in the water level of a water source due to natural or other reasons is called water supply flexibility. When water services are flexible, no one will be dissatisfied with the water service, all of which will receive a real share. Water efficiency is especially important when it comes to water conservation. The notion of saving water where water is not being measured is meaningless.

Two indicators are used when measuring water quality. The first of these is the amount of water received. The amount of water referred to is the volume of water taken from the sac at a given time [6]. The amount of water is often measured in m^3. The second dimension is the flow of water. Water flow (consumption) - refers to the volume of

water flowing in a unit of time from the sac at a given time. Water flow is measured in units such as l/s, m^3/min or m^3/s.

Criteria such as the fairness, reliability, and flexibility of the water service used to assess the quality of water services are expressed in numbers. When evaluating the indicators, the best score is 4 points and the lowest score is 0 points and the total score is calculated. To do this, it is recommended to use the criteria listed in Table 1 below.

Table 1

Indicators and criteria for evaluating the quality of water services

Indicators	**Ball (mark)**	**Evaluation criteria**
1	*2*	*3*
Measurement of water supplied to the field	**4**	The amount and flow of water supplied to the field is measured, and recorded with the most accurate equipment.
	3	The amount and flow of water supplied to the field is measured, and recorded using simple equipment.
	2	The amount of water supplied to the field and the flow is measured with low accuracy
	1	Only the flow of water supplied to the field is measured with low accuracy
	0	The water supplied to the field is not measured
The fairness of the distribution of water	**4**	All neighboring water utilities use the same water services.
	3	All neighboring water utilities use the same water services, and but they are not the same within the economy.
	2	The total amount of water to be harvested from the household is taken, but the water services within the household are not the same.
	1	Water services in and out of the farm are not the same
	0	The difference in household water services is more than 50%
Reliability of water supply	**4**	The amount of water used is dimensional. Water is supplied in the amount and on time specified in the contract.
	3	The amount of water used is dimensional. Water services are sometimes different from contracts.
	2	The amount of water used is not measurable. Water is not supplied on a planned basis, but is provided in approximately the required amount.
	1	The amount of water used is not measurable. Water supply is somewhat unreliable, and water is often delayed.
	0	The amount of water used is not measurable. It is unknown at this time what he will do after leaving the post.

1	*2*	*3*
Flexibility of water distribution	**4**	When water is depleted in a water source, all water users receive equally depleted water.
	3	When water is depleted in a water source, some water users are not provided with the same amount of depleted water.
	2	When household water is depleted, all tenants in the household use water equally.
	1	When household water is depleted, all tenants in the household use water equally.
	0	When there is a shortage of water, tenants near the river use more water than the ones below.

The distribution of water in the components of the irrigation system is based on the information on the water demand of the water users. Where this rule is not complied with, some households lack water to irrigate their crops in a timely manner, while in other households the level of groundwater increases due to overuse of water. In order to make effective use of the limited water resources available, an internal economic plan for water use is being developed, taking into account the water users' demand for water over time.

The internal economic plan for water use is a document that shows where to plant, how many hectares of land, which crop, when, how much water to take, from which bowl to draw water and how to irrigate. Once the document is developed by the households themselves and approved by the water authorities, the basis for concluding an agreement with the water authorities is that the farms receive their water shares.

Prior to the drafting of an internal economic plan, the state authority for irrigation determines the approximate limit (limited volume) of water to be used by all irrigators for each water supply from the irrigation system. This limited volume can be determined in previous years based on the data of given water for a specific area of irrigated land. Project information can be used if the system is new. Theoretical calculations can also be used.

When determining the approximate limit for water use, it is necessary to fully satisfy the water demand of agricultural crops in irrigated areas, to carry out agro-technical measures during irrigation, to maintain irrigation canals (canals) and to treat irrigation canals and facilities. Capabilities such as water supply needs need to be considered. Approximate water intake limits (limits) for water users are limited to the water supply limit of the water source, restrictions

related to the structural (constructive) features of the main water supply, and the capacity of the irrigation system components to be transported. Water volume limitations can be summed up for the entire irrigation season or its individual periods. The sum of the limited volumes (limits) of all water users for water drawn from one source of the irrigation system shall not exceed the limited volume of this source. It is recommended that 50% of the water supply be supplied from the source when constructing approximate volumes (limits).

Water users are developing an in-house water use plan for themselves based on an approximate limited volume. The plan is drawn from “bottom” to “top” as shown in Figure 1 below.

As can be seen from the picture, the plan is first drawn up by the water users themselves and submitted to the local water management agency. The local water management agency draws up a water use plan for the entire irrigation system based on plans from all households and compares it to the water supply situation of the year. First, each water user calculates the amount of water required for the production of agricultural crops, based on which the total amount of water to be taken into the irrigation system is determined, and the distribution of water by the irrigation system is determined. Thus, the work of drawing up a water use plan is being carried out in phases. First, the order, timing and quantity of water to be irrigated to each irrigated area are determined, and a separate household water use plan is developed for each household. The irrigation system is then drawn up on the basis of the plans of all households in the irrigation system. In addition, when planning a water use plan for the irrigation system, repairs are to be carried out on all parts of the system. This helps to keep water facilities and breweries in proper condition and helps them to conserve water from the source in a timely manner, delivering it to non-waste water users and making it economical within the household.

A scientific approach to the development of a water use plan in climate change is a modern requirement. To comply with this requirement, a household must have a passport of the fields, i.e. a database, in each household. It allows the user to use the land and water efficiently and to organize the technical, economic and organizational measures accordingly.

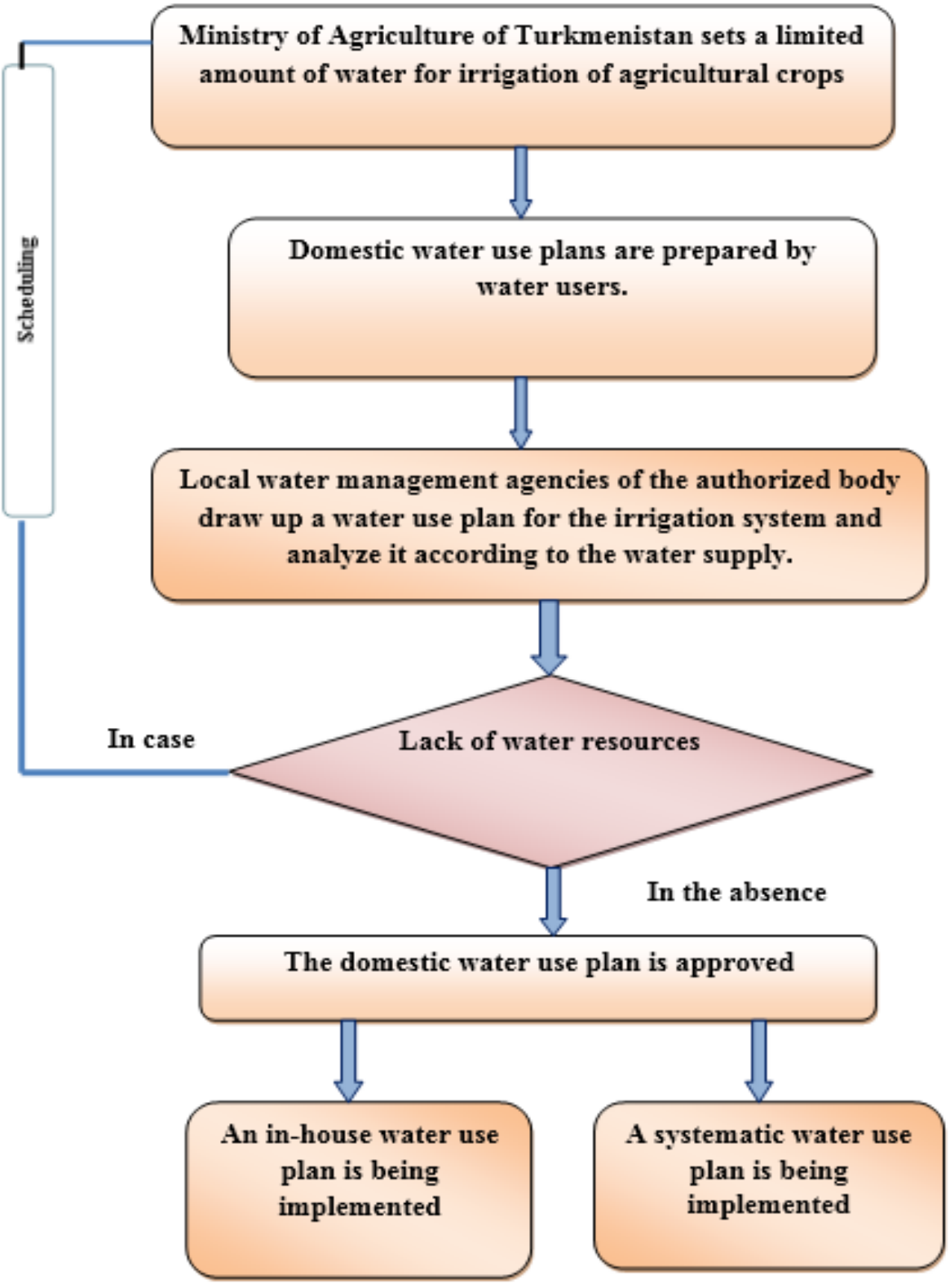

Figure 1. **Procedure for drawing up an internal water use plan**

In the database, the size of the fields, the mechanical composition of the soil, the level of salinity, the supply of nutrients and their variation over the years, the preservation of rot, the order of the crop

rotation used, the quantity and quantity of the harvested crops in the previous years, the quantity and quality of the transferred crop. These indicators are important for decision-making on agro-ameliorative and irrigation measures. Farmers, landlords and tenants need to be well versed in modern equipment and appropriate methods to prepare the database and fill it in on a regular basis. Not all of them have the opportunity to go to university to get a higher education to meet this demand. It is one of the main tasks of scientists and experts working in the field of agriculture to convey to them the scientific advice they need in a timely and clear language. In order to successfully carry out this task, it is necessary for farms, farmers and associations to work closely with scientific centers.

Planned use of water means the use of water in accordance with the procedure established by law. In accordance with Article 41 (7) of the Water Code of Turkmenistan, water users are obliged to keep a record of the amount of water received and used. And the account can only be maintained where there is a measure. In this regard, the development and implementation of an internal economic plan for water use and production in the efficient use of limited water resources of our country is of great industrial and ecological significance.

Content of the internal water use plan

The set of organizational and technical measures in the internal irrigation system for the purpose of sustainable and high yields from irrigated farmland is called the use of water according to the planned irrigation system.

Planned water use is part of the day-to-day work of the irrigation system and its individual components.

Tasks of water use according to the plan:

- estimating and determining the amount of water to be taken from the source;
- distributing water from the source to water users in a timely and necessary amount and distributing it fairly and without loss on farmland;
- Repair and inspection of bakeries and water facilities and keep them in good condition.

The water use plan envisages coordinating the irrigation of agricultural crops with other organizational and technical measures. Therefore, the use of irrigation water is an integral part of the technological work of agricultural production. Each household's water use plan is included in its production and financial plan.

Failure to comply with the water use plan on the farms leads to misuse of water from the source, deterioration of the technical condition of the irrigation system and reclamation of irrigated lands. This in turn reduces the productivity of farmland.

The task of formulating a water use plan is to match the amount of water needed to produce high yields for each household to the amount of water supplied to the household.

The water use plan should pay special attention to the timely repair of reclamation and irrigation facilities, the provision of production and irrigation works in separate parts of irrigated areas, and the list of workers needed to use the irrigation system. The components of the irrigation system are shown in Figure 2.

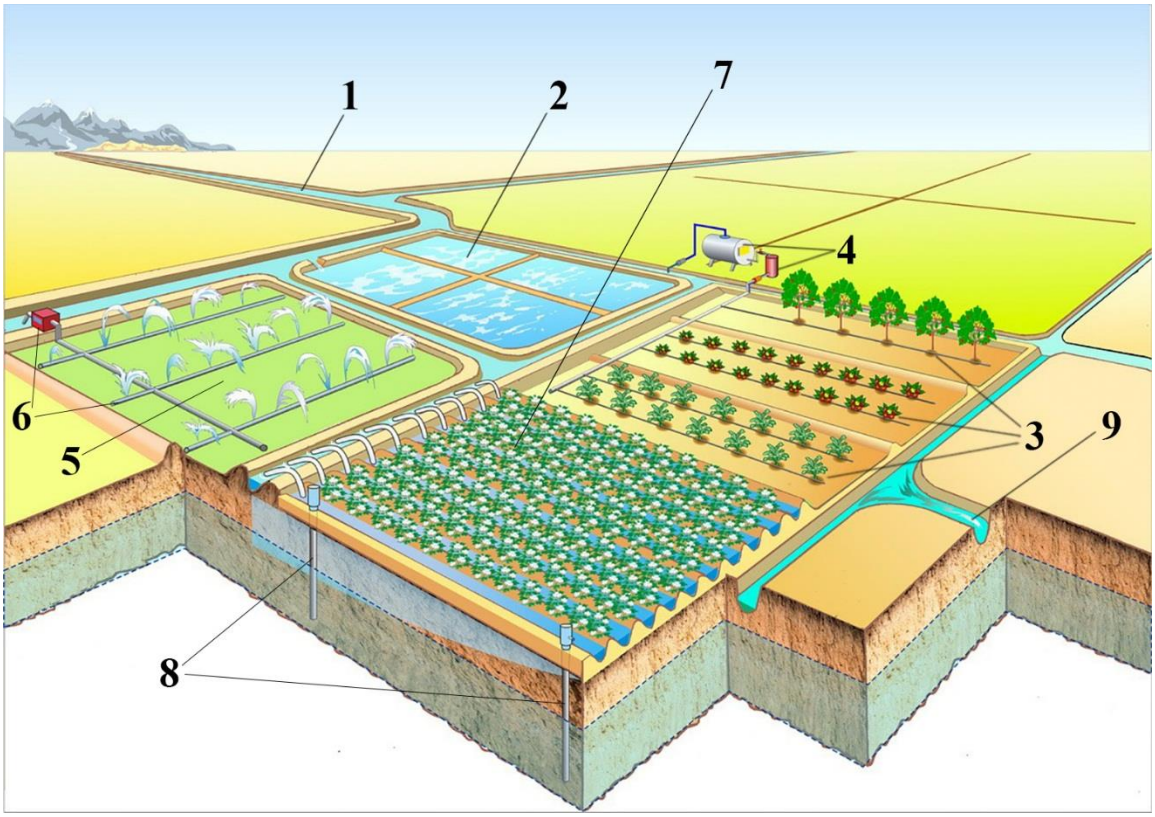

Figure 2. **Irrigation system components.**

1 - Main waterway; 2- Crop irrigated fields; 3-Drip irrigated crops and gardens; 4-Drip irrigation equipment; 5- Irrigated arable land; 6-Rainfall irrigation equipment; 7-Cache irrigated arable land; 8-control wells; 9- drainage system.

Due to the change in weather, hydrological and other conditions during the year, the indicators of the plan are likely to change significantly, which is why the water use plans for the household are being amended. This requires a reconsideration of the water use plan and it takes a lot of time to compile. Therefore, in the first phase of water use, it is considered appropriate to develop and use a shortened water use plan that helps to analyze the key indicators for each household.

The plan sets out the amount of water to be provided to each household in each decade of the irrigation season. The basis of this plan is the irrigation system's water distribution plan. In the language of the watermen, this plan is called the water demand (order) of the household. The water demand of the farm serves as the main tool for the implementation of the domestic water use plan. We will discuss in more detail the procedure for compiling it in the following sections.

The composition of the domestic water use plan includes the following information:

- explanatory notes on the activity of the household;
- limited amounts of water use approved by the authorized state body;
- a map showing the irrigated lands, dams, drains and other irrigation facilities of the household;
- area of irrigated areas of the farm on beams;
- placement of types of agricultural crops on beans on the farm;\
- technical characteristics of the in-house irrigation system;
- an annual plan for irrigation of agricultural crops on beans on the farm;
- a plan to carry out technical repairs in the field of irrigation in the household;

- information on the irrigation equipment and water supply of the household;

- information on the state of drinking water supply in the farm and the needs of livestock farms;

- an annual water catchment plan;

- household water demand.

Explanatory notes on the activity of the farm should describe the types of crops in the crop and the amount of fertilizers and fertilizers used in the previous years. The efficiency of water use in irrigated agriculture depends on the types and indicators of soil cultivation techniques.

This is because the parameters such as water permeability of the soil, the rate of evaporation of water from the soil, and the spread of the roots to the active layer of the soil are determined by the influence of the techniques used. Therefore, the explanatory notes should show the strength and performance of the techniques used.

The records should also contain information on the organization of water retention in the water supply system of the household. The depth of groundwater level and its salinity are one of the main factors influencing the water demand of agricultural crops. Information on the level of salinization of irrigated lands and the type of salinization should also be included in the records as the necessary information to organize the proper conduct of waste water.

According to the current water legislation in our country, the limited amount of water used annually by the state body authorized by the state body should be the basis for the preparation of a day-long water retention plan. According to international experience, there are two approaches to water use.

The first of these relates to water management [6] .In water management, the water user requires the water necessary for a high yield. The amount of water required is determined on the basis of irrigation rules for agricultural crops approved by the state government [5]. Water reservoirs are being built or additional water

sources are being explored to meet the demand of the water user. Such a rule came into force in the second half of the last century.

The second approach is called water management. According to this approach, the irrigator provides the water user with the water he or she has. The water user has to plan his or her fields according to the limited amount of water. In this case, the possibility of irrigating agricultural crops using irrigation rules is reduced. If high yields are to be produced with limited water, then modern water-saving technologies will have to be put into production.

If the household has a map showing irrigated fields, dams, drains and other irrigated farming facilities, it will be easy for the water user to go to the water management office and explain the water use plan. If such a card is not in the household, it is possible to use simple diagra as in Figure 3 below.

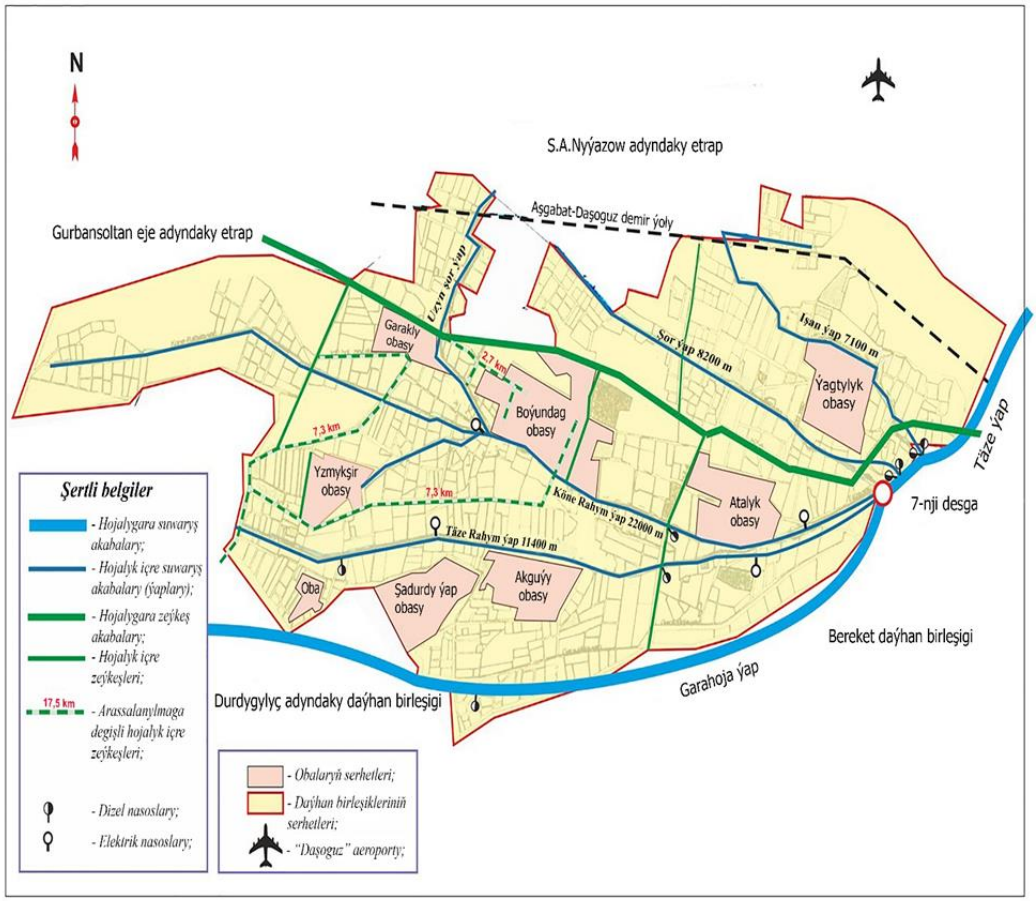

Figure 3. **Map of Yagtylyk Farmers' Association of Gorogly District, of Dashoguz region**

The smaller the number of watersheds on the farm and the shorter the total length of the yams, the more water is saved. However, water retention requires high organization. On the one hand, some water users have to take care of themselves or dig dams on their own in order to gain water independence, on the one hand, causing additional water losses, and on the other hand, making it difficult to implement a water use plan.

The irrigated areas of the farm along the watershed are prepared by the agronomist. It can be used for several years. An example of the irrigated areas of the farm along the watershed is shown in Table 2 below.

Table 2

Information about the watershed of the "Yagtylyk" farmer association of Gorogly district of Dashoguz region

№	Names of watersheds	The area of irrigated lands from this watershed , ga	the length of the stream, m	Watershed water permeability, m3 / sec	Number of layers on watershed
1.	Ishan stream	408	7100	0,5	3
2.	Shor stream	837	8200	0,8	5
3.	Old Rahym stream	432	22000	0,8	11
4.	New Rahym stream	567	11400	0,8	14
5.	Garahoja stream	617	8350	0,5	3
total		**2861**	**57050**	**3,4**	**36**

The placement of agricultural crops on watershed on the farm varies from year to year. This is because the crop rotation chart, household labor and water supply, market prices of agricultural products, and weather conditions can affect this indicator. With the introduction of market relations in agriculture, the amount of income per hectare becomes a priority for the farmer. This indicator is inextricably linked to soil fertility. Therefore, it is important to select the most profitable crops according to the size of the soil when placing agricultural crops on the beehives. Soil rehabilitation measures should

also be taken into account. Table 3 below shows the placement of agricultural crops on beans.

Table 3

Arrangement of agricultural crops on the watershed of the "Yagtylyk" farmers' association of Gorogly district of Dashoguz region 2019y)

No	Names of watersheds	Total irrigated area, ga	Including crop varieties, ga				
			Cotton	Wheat	Alfalfa	Other crops	crop fields
1.	Ishan stream	408	208	180	5	3	12
2.	Shor stream	837	560	250	-	7	20
3.	Old Rahym stream	432	270	120	7	10	25
4.	New Rahym stream	567	350	175	6	11	25
5.	Garahoja stream	617	392	195	7	3	20
total		2861	1780	920	25	34	102

The technical characteristics of the in-house irrigation system are of great importance in the efficient use of water. Water losses in the irrigation system should be as minimal as possible. First and foremost, the cleanliness of the irrigation canals, the absence of leaks in the layers, and the width and depth of the canals in accordance with the amount of water flowing from it have a positive effect on reducing water losses. The water supply of each household should correspond to its irrigation area. If a small area is irrigated from a large dam, there will be a lot of water loss. If an attempt is made to irrigate a field larger than a small canopy, on the one hand, the water will flow out of the canopy without lifting the canopy, and on the other hand, there will be a loss of water if the crops are not irrigated in time. Prior to the start of the plan, the water users' representatives responsible for the efficient use of water, taking into account the smallest dams in the household, mark them with conditional marks. When it is determined, the traps returning from the trough that draw water from the trunk canal to the farm will be first-class, the traps that flow from it will be second-rate, and those who take care of them will be third-rate.

Subsequent divisions often include readings. Once the closures are marked with conditional marks, the relevant measurements should be made and the data should be prepared in the form of Table 4 below.

Table 4

Technical characteristics of the irrigation system on the Ishanyap watershed of the Yagtylyk farmers' association of Gorogly district of Dashoguz region

Production group number	The conditional number of streams	The water permeability of the watershed, l/s	The length of stream	The PTK of the stream, %	The area to be irrigated, ga	A record of the technical condition of the shaft and the facilities therein
9	BX-9-2	200	980	0,8	70	Pipe should be replaced
	BX-9 -1	300	650	0,8	85	The stream should be cleaned
11	BX-11 -3	300	1250	0,8	80	The layer must be repaired
	BX-11 -1	250	1480	0,8	72	The stream should be cleaned
	BX-11 -2	200	1560	0,8	75	The stream should be cleaned
13	BX-13 -1	150	850	0,8	65	The stream should be cleaned
	BX-13 - 2	120	680	0,8	60	The stream should be cleaned

One of the most important technical characteristics of irrigation canals is the effective impact coefficient (EIC) of the canopy. EIC is an indicator of the ratio of the amount of water flowing in a unit of time at the beginning of this stream to the amount of water at the end of the stream. This figure cannot be calculated without measuring the water flowing through the dam. It is not possible to distribute a fixed and approved water share to the fields without measuring the amount of water flowing from the slopes. If the water flowing from the dams has not been measured, the level of implementation of the water supply agreement with the water management agency cannot be assessed. Paragraph 7 of Article 40 of the Water Code of

Turkmenistan guarantees the right of water users to check the quality and quantity of water supplied. In order to exercise this right, one must first learn how to measure water. The level of its efficient use without measuring water cannot be accurately estimated. Based on these arguments, farmers need to learn how to measure water.

An economic water use plan is a document drawn up by a water user that defines the relationship between a water user and the use of water resources.

The economic plan for water use must specify the requirements of the water user for irrigation water for the different periods of crop development, and on the basis of which the water user's farm must be supplied with the required amount of water.

Water volume requirements for irrigation are determined in accordance with the accepted irrigation rules of agricultural crops and scientifically based rules for water use.

The type of irrigation technology used by the water user, work and production reserves, washing and amount of water should also be taken into account when formulating an economic water use plan.

In the event that the water user receives water from the local irrigation sources for irrigation of agricultural crops, the water supply contract shall set the water supply limit based on the water supply level of the irrigation source.

The water use economic plan is drawn up in the form of a table for each agricultural crop, which must specify the area of the crop, the timing and number of irrigation, the irrigation rules, the amount of water to be used, and the methods of irrigation.

The water use economic plan is drawn up in the form of a table for each agricultural crop, which must specify the area of the crop, the timing and number of irrigation, the irrigation rules, the amount of water to be used, and the methods of irrigation. Information and documents on the economic water use plan are submitted to the local state water supply authority.

A date plan to irrigate crops

The date water catchment plan for crops is at the heart of the water use economic plan. It is important that all the data collected is used appropriately. Irrigation regulations used so far in our country have been developed and approved until 1990. These rules are not in line with today's requirements in recent years due to changes in the climatic conditions and irrigated lands, especially the location of salinity, alkalinity and groundwater. Today, the Water Code of Turkmenistan does not mention the concept of irrigation rules.

Instead, Article 53 (2) of the Water Code stipulates that **"Water users are limited by the water limits set in accordance with Article 102 of this Code when they plan the amount of arable land and determine the amount and timing of water use".**

Article 102 of the Water Code stipulates that **"Limited water use rates for specific water users shall be established by the authorized body and shall be enforced by water users regardless of which sector they belong to and the type of ownership".**

Therefore, there is a need to adopt a limited amount of water use instead of a scientifically based irrigation norm. When a limited amount of water is provided by the authorized body, those amounts are given by priority. Along with it, the watering times for the crops are also indicated and the duration of the watering is determined by the deadlines. It is convenient to schedule a crop watering schedule using the Excel table on the computer (Table 5). In the first column of the spreadsheet are the names of the beams of the household that draw water from the main channels. Sacks should have water levels and levels.

The watersheds are equipped with water meters. The water level in front of and behind the beams and the amount of water taken from the beams should be monitored on a regular basis. Water accounting must also be maintained. The standard use of water guarantees the fairness and reliability of water distribution.

Table 5

Date water retention plan for 2019 for Ishanyap watershed of Yagtylyk farmers' association of Gorogly district of Dashoguz region

The watershed of Ishan stream	Name of the crop, field irrigation norm, m3	Types of irrigation waters	Water retention rules,m3	The date beginning of the water to be irrigated	The date of the finishing of the irrigation of water	The continuation of water irrigation	January			February			March			April			May			June		
							I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
	Cotton	Ýorunja	2900	10,01	20,03	70	8	29,7	32,7	29,7	29,7	23,8	29,7	29,7										
	208	tagt	1500	10,03	20,04	42							5,0	49,5	54,5	49,5	49,5							
	7000	1-ösüş	800	01,06	10,07	40																52,0	52,0	52,0
		2- ösüş	900	15,06	30,07	45																	23,1	46,2
		3- ösüş	900	15,07	25,08	42																		
	Water irrigation area				irrigated/ga		3,0	29,7	32,7	29,7	29,7	23,8	34,7	79,2	54,5	49,5	49,5	0,0	0,0	0,0	0,0	52,0	75,1	98,2
	Water irrigation area in ascending orders				irrigated/ga		3,0	32,7	65,4	95,1	124,8	148,6	183,2	262,5	317,0	366,5	416,0	416,0	416,0	416,0	416,0	468,	543,1	641,3
	The amount of received water				thousand,m^3		8,6	86,2	94,8	86,2	86,2	68,9	93,6	160,5	81,7	74,3	74,3	0,0	0,0	0,0	0,0	41,6	62,4	83,2
	The amount of water in ascending orders				thousand,m^3		8,6	94,8	189,6	275,7	361,9	430,9	524,5	684,9	766,6	840,9	915,2	915,2	915,2	915,2	915,2	956,8	1019	1102
	Water flow				l/s		99,7	99,7	99,7	99,7	99,7	99,7	108,3	185,7	86,0	86,0	86,0	0,0	0,0	0,0	0,0	48,1	72,2	96,3
	Wheat	Tagt water	2400	01,08	20,10	81																		
	180	1-ameliorati on	1200	01,03	10,04	41							43,9	43,9	48,3	43,9								
	5300	2-ameliorati on	900	01,04	10,05	40										45,0	45,0	45,0	45,0					
		3- ö ameliorati on	800	10,05	10,06	32													5,6	56,3	61,9	56,3		
	Water irrigation area				irrigated/ga		0,0	0,0	0,0	0,0	0,0	0,0	43,9	43,9	48,3	88,9	45,0	45,0	50,6	56,3	61,9	56,3	0,0	0,0
	Water irrigation area in ascending orders				irrigated/ga		0,0	0,0	0,0	0,0	0,0	0,0	43,9	87,8	136,1	225,0	270,0	315,0	365,6	421,9	483,8	540,0	540,0	540
	The amount of received water				thousand,m^3		0,0	0,0	0,0	0,0	0,0	0,0	52,7	52,7	58,0	93,2	40,5	40,5	45,0	45,0	49,5	45,0	0,0	0,0
	The amount of water in ascending orders				thousand,m^3		0,0	0,0	0,0	0,0	0,0	0,0	52,7	105,4	163,3	256,5	297,0	337,5	382,5	427,5	477,0	522,0	522,0	522,0
	Water flow						0,0	0,0	0,0	0,0	0,0	0,0	61,0	61,0	107,9	46,9	46,9	52,1	52,1	52,1	52,1	52,1	0,0	0,0
	The PTK of streams						0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65
	Water irrigation area				irrigated/ga		3,0	29,7	32,7	29,7	29,7	23,8	78,6	123,1	102,8	138,4	94,5	45,0	50,6	56,3	61,9	108,3	75,1	98,2
	Water irrigation area in ascending orders				irrigated/ga		3,0	32,7	65,4	95,1	124,8	148,6	227,1	350,3	453,0	591,5	686,0	731,0	781,6	837,9	899,8	1008	1083	1181
	The amount of received water				thousand,m^3		13,3	132,6	145,8	132,6	132,6	106,1	225,1	327,9	214,9	257,6	176,6	62,3	69,2	69,2	76,2	133,2	96,0	128,0
	The amount of water in ascending orders				thousand,m^3		13,3	145,8	291,7	424,2	556,8	662,9	887,9	1215	1430		1864	1927	1996	2065		2275	2371	2499
	Water flow				l/s		153,4	153,8	168,8	153,4	153,4	122,8	260,5	379,5	248,7	298,2	204,4	72,1	80,1	80,1	88,1	154,2	111,1	148,1

Continuation of Table 5

The watershed of Ishan stream	The name of the plant, the irrigation rule of the field, m^3	Types of irrigation waters	Water retention rules, m3	The date beginning of the water to be irrigated	The date of the finishing of the irrigation of water	The continuation of water irrigation	July			August			September			October			November			December		
							I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
	Gowaça	Ýorunja	2900	10,01	20,03	70																		
	208	tagt	1500	10,03	20,04	42																		
	7000	1-amelioration	800	01,06	10,07	40	52,0																	
		2-amelioration	900	15,06	30,07	45	46,2	46,2	46,2															
		3- ö amelioration	900	15,07	25,08	42		29,7	54,5	49,5	49,5	24,8												
	Water irrigation area				irrigated/ga		98,2	75,9	100,7	49,5	49,5	24,8	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	Water irrigation area in ascending orders				irrigated/ga		739,6	815,5	916,2	965,7	1015	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	1040	104,0	1040
	The amount of received water				thousand,m^3		83,2	68,3	90,6	44,6	44,6	22,3	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	The amount of water in ascending orders				thousand,m^3		1185	1253	1344	1389	1433	1456	1456	1456	1456	1456	1456	1456	1456	1456	1456	1456	1456	1456
	Water flow				l/s		96,3	79,1	95,4	51,6	51,6	51,6	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	Bugdaý	Tagt suw	2400	01,08	20,10	81				22,2	22,2	24,4	22,2	22,2	22,2	22,2	22,2		0,00					
	180	1- ösüş	1200	01,03	10,04	41													0,00					
	5300	2- ösüş	900	01,04	10,05	40													0,00					
		3- ösüş	800	10,05	10,06	32													0,00					
	Water irrigation area				irrigated/ga						0,0	0,0	0,0	22,2	22,2	24,4	22,2	22,2	22,2	22,2	22,2	0,00	0,00	0,00
	Water irrigation area in ascending orders				irrigated/ga						540,0	540,0	540,0	562,2	584,4	608,9	631,1	652,3	675,6	675,6	697,8	720,0	720,0	720,0
	The amount of received water				thousand,m^3						0,0,	0,0	0,0	53,3	53,3	57,7	53,3	53,3	53,3	53,3	53,3	0,0	0,0	0,0
	The amount of water in ascending orders				thousand,m^3						522,0	522,0	522,0	575,3	628,7	687,3	740,7	794,0	847,3	900,7	954,0	954,0	954,0	954,0
	Water flow						l/s	0,0	0,0	61,7	61,7	61,7	61,7	61,7	61,7	61,7	61,7	61,7	0,0	0,0	0,0	0,0	0,0	0,0
	The PTK of streams						0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	0,65	
	Water irrigation area				irrigated/ga		98,2	75,9	100,7	71,7	71,7	49,2	22,2	22,2	22,2	22,2	22,2	0,00	0,0	0,0	0,0	0,0	0,0	0,0
	Water irrigation area in ascending orders				irrigated/ga		1279	1355	1456	1452	1599	1648	1671	1693	1715	1737	1760	1760	1760	1760	1760	1760	1760	1760
	The amount of received water				thousand,m^3		128,0	105,1	139,4	150,6	150,6	124,5	82,1	82,1	82,1	82,1	82,1	0,0	0,0	0,0	0,0	0,0	0,0	0,0
	The amount of water in ascending orders				thousand,m		2627	2732	2871	3022	3172	3297	3379	3461	3543	3625	3707	3707	3707	3707	3707	3707	3707	3707

The following columns of the spreadsheet include the name of the irrigated crop, the area occupied by the irrigated crops, and the irrigation rules. Various authors refer to irrigation norms as their own irrigation norms, irrigation rules, and irrigation standards.

Irrigation at each stage of crop development is called the irrigation norm for the amount of water to be consumed per hectare to fully irrigate a certain layer of soil. Irrigation regulations for agricultural crops are being developed taking into account best practices in research institutions. Irrigation norms are determined depending on the type of crop, the growing period, the mechanical composition of the soil, the salinity of the soil, the level of groundwater and the salinity. If the groundwater level is less than 2 meters, the soils are in a hydromorphic state. In this case, 80% of the water demand of agricultural crops is met by groundwater.

When the groundwater level in the fields is within 1-3 m, the topsoil is irrigated by capillaries from them (Table 6).

Table 6

Depending on the type of soil and location, volumes of use of groundwater of agriculture crops

Type of soil	Depth of groundwater, m					
	1-1,5	1,5-2	2-2,5	0,5-1	1-1,5	1,5-2
	Grain and technical crops groundwate use volumes, m^3			Vegetable crops groundwater use volumes, m^3		
Light sandy	800-1000	-	-	600-900	-	-
Light clay	1000-1200	500-1000	-	700-1000	500-700	-
Medium clay	1200-1500	600-1200	-	900-1200	600-900	500-600
Heavy clay	1500-2000	1000-1500	500-1000	1200-1600	800-1200	400-800
Clay	2000-3000	1500-2000	1000-1500	1500-2000	1000-1500	500-800

Studies in Central Asian countries, including Turkmenistan, have shown that a certain portion of the water demand during crop development is provided by groundwater (Tables 7-8).

The calculations in the table above suggest that the salinity of the groundwater used by the plants should be less than 3 g/l. Under production conditions, groundwater levels should not be allowed to

rise or evaporate, and the secondary salinization of soils begins when their level is above 5 g/l.

In the 8th column of the spreadsheet are calculated as the areas for water retention for decades. To do this, multiply the number of days to be watered to the hectares of arable land and it divided into the duration of watering.

Table 7

Groundwater supply of agricultural plants' demand for water, (%)

Crops	Depth of groundwater, m		
	1-2	2-3	3-den aşak
	Groundwater use of crops, (%)		
Cotton	30-75	15-40	5-25
Alfalfa	40-80	25-80	20-35
Perennial wild plants	90	85	80

Table 8

Groundwater use volumes of agricultural crops, m^3/ga

Crops	Depth of groundwater, m		
	1-2	2-3	3-den aşak
	Groundwater use of crops, (%)		
Cotton	2000-3000	1500-2000	500-1000
Alfalfa	3000-4000	2000-3000	1000-2000

It is not possible to divide the water by dividing it into a large number of small streams when formulating an annual water retention plan for crops. This is because when the water is divided into many dams with a low flow, there will be a lot of water loss in the dam and the productivity of the plumber will be reduced. It is also becoming increasingly difficult to carry out treatment between rows of crops.

Below is an example of a household water use calculation plan.

1. The water use plan for the household canal is based on the above data as follows.

$$Q_{nj} = q_{dj} \times \Omega_j, \qquad (1.1)$$

here:

Q_nj is the water needed to irrigate the j agricultural crop

Current, l / s or m3 / s;

q_dj is the decimal point in the i-tenth of the j agricultural crop

Hydro module, l / s / ha;

Ω_j is the irrigated area of the j agricultural crop, ha.

Calculations are carried out on each farm channel on the hydrodynamic subdivisions of all agricultural crops. Decimal water consumption for all agricultural crops is summarized and the cost of decimal water consumption for the agricultural canal is determined.

2. The amount of water to be supplied to the household decimal from each household channel (gross amount of water supplied to the household from the household) is calculated according to the following formula.

$$Q_b = Q_n \times \eta, \qquad (1.2)$$

here:

Q_b is the amount of water to be supplied through the household channel (gross);

Q_n is the amount of water used in the household channel (net);

η is the coefficient of useful influence of the household channel in the computational decimal (PTK).

3. The amount of water flowing into each household from the household canal is calculated according to the following formula.

$$W = Q_b \times T = 0{,}0864 \times Q_b \times t, \qquad (1.3)$$

here

W - household channel flow (gross);

Q_b is the amount of water to be supplied through the household channel (gross);

T is the number of seconds in decimal;

0.0864 - transmission coefficient;

t is the number of days in the decimal point.

4. The aggregate amount of water supplied to the household from the sac is calculated as the sum of the decimals flow, determined by the formula below.

here:

W_rΣ is a household from the 1st to the 10th decimal of the calculated period total water flow through the canal (gross);
W_d is the amount of water supplied to the household canal in gross.

$$W_{r\Sigma} = \sum_{d=1}^{r} W_d \text{ ,(1.4)}$$

This procedure is mainly intended for students, teachers and researchers. In practice, water users can derive the results of these calculations from a planned water catchment plan, and on the basis of that information, they determine the demand for irrigation water for irrigation of agricultural crops first on the beams and then on the farm (Table 9).

Table 9

Yagtylyk Farmers' Association of Gorogly District, of Dashoguz region's demand for Irrigation Water in Agricultural Areas in 2019

Months	Decades	From all water sources							
		In the household of water to be taken			to the fields in the inner enclosure of water to be taken			irrigated area, thousand ha	
		Amount -Q, m^3/s	Flow mln.m^3	flow in an increasing order	amount -Q, m^3/s	Flow mln.m^3	flow in an increasing order	in decades	in an increasing order
January	I	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	II	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	III	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
February	I	2.72	2.35	2.35	1.92	1.66	1.66	0.713	0.713
	II	2.71	2.34	4.70	1.92	1.65	3.32	0.713	1.426
	III	2.43	1.89	6.59	1.72	1.33	4.65	0.571	1.997
March	I	2.21	1.91	8.50	1.56	1.35	6.00	0.970	2.967
	II	2.21	1.91	10.41	1.56	1.35	7.35	0.970	3.937
	III	2.20	2.09	12.5	1.55	1.47	8.82	1.069	5.006
April	I	1.00	0.87	13.37	0.71	0.61	9.43	0.427	5.433
	II	1.08	0.93	14.3	0.76	0.66	10.09	0.488	5.921
	III	1.10	0.95	15.25	0.77	0.67	10.76	0.496	6.417
May	I	1.17	1.01	16.26	0.82	0.71	11.47	0.529	6.945
	II	1.17	1.01	17.27	0.82	0.71	12.18	0.530	7.476
	III	0.72	0.69	17.95	0.51	0.48	12.67	0.317	7.793
June	I	1.31	1.13	19.08	0.92	0.80	13.46	0.687	8.480
	II	1.33	1.15	20.23	0.94	0.81	14.27	0.693	9.173
	III	1.42	1.23	21.46	1.00	0.87	15.14	0.752	9.927
July	I	1.41	1.22	22.68	1.00	0.86	16.00	0.717	10.644
	II	1.42	1.22	23.90	1.00	0.86	16.87	0.720	11.364
	III	140	1.33	25.23	0.99	0.94	17.80	0.726	12.089
August	I	1.36	1.17	26.40	0.96	0.83	18.63	0.691	12.780
	II	1.45	1.25	27.66	1.02	0.88	19.52	0.716	13.496
	III	2.39	2.28	29.93	1.69	1.61	21.12	1.081	14.577
September	I	1.34	1.16	31.09	0.95	0.82	21.94	0.426	15.04
	II	1.26	1.09	32.18	0.89	0.77	22.71	0.389	15.393
	III	0.30	0.26	32.44	0.21	0.18	22.89	0.046	15.438
October	I	0.14	0.12	32.56	0.10	0.09	22.98	0.070	15.508
	II	0.14	0.12	32.68	0.10	0.09	23.06	0.070	15.577
	III	0.13	0.13	32.81	0.09	0.09	23.15	0.077	15.654

November	I	0.14	0.12	32.93	0.10	0.08	23.24	0.070	15.724
	II	0.13	0.12	33.05	0.09	0.08	23.32	0.068	15.792
	III	0.13	0.12	33.16	0.09	0.08	23.40	0.068	15.860
December	I	0.00	0.00	33.16	0.00	0.00	23.40	0.00	15.860
	II	0.00	0.00	33.16	0.00	0.00	23.40	0.00	15.860
	III	0.00	0.00	33.16	0.00	0.00	23.40	0.00	15.860

Internal water use plan implementation into production

Implementation of the internal water use plan for production ensures efficient use of irrigation water; increase the efficiency of irrigation and irrigation equipment.

Before determining the household's demand for water, the technical condition of the irrigation system in the farm and the readiness of the farmland for irrigation should be analyzed. This is because the delivery of the measured water to the loss-free areas requires that the technical condition of the system be satisfied.

Internal irrigation ditches should be cleared of weeds before the start of the growing season. The cross-sectional area of the slopes and the slope of the water surface should correspond to the amount of water to flow through the slope. The depth of the slopes should be as high as possible so that the sunlight does not heat the bottom of the slopes. If the depths of the canals are small and the width is large, then the sunlight will allow the grass to grow green at the bottom of the canopy and the water in the canopy to evaporate. The speed of the water should be sufficient so that the threshing floors do not sink. When water moves at a low speed, threshing sinks to the bottom of the canal, reducing their water permeability.

Irrigation canals should be equipped with water meters. It is not possible to implement a water use plan for production without the measurement and reporting of the water received. Irrigation in irrigated districts plays an important role among agro-technical measures. The amount and timing of the water to be supplied to agricultural crops are determined depending on the growing seasons of the crops, pre-sowing treatments and spilled fertilizers. All planted

areas are subject to the estimated amount of water under the water use plan within the stipulated time.

The main objective of the domestic economic plan for water use is to ensure the proper, efficient and economical use of irrigation systems for sustainable and high yields from cultivated crops. The water use plan is developed separately for each household (household water use plan) and systems (system water distribution plan).

The household's production and financial plan includes an in-house water use plan. The timing and quantity of water retention in the farm are determined by research based on the proposals of scientific institutions and advanced production for the economic plan. Based on them, production studies are being carried out to determine the planned irrigation rules of the crops, taking into account the reclamation status of the lands, the agro-technical measures carried out and the organization of irrigation. In small systems, water loss is estimated based on actual measurements during irrigation. Water users plan to use their irrigated land based on their personal economic interests, but follow the advice and advice on using scientifically based principles to develop an economic plan to increase productivity and make more efficient use of existing water and land resources.

The farm's water use plan is designed for the growing season. The plan sets out the areas according to the types of crops at the distribution stations and the required amount of water per decade. The plan should take into account the reclamation status of the arable lands, the water-carrying capacity of the facilities and streams, and the amount and flow of water that can be obtained from the water-sharing station when the water of the irrigation source is reduced during the drought year.

The water use plan requires controlling under the following conditions:

1. Watering of agricultural crops should be combined with inter-treatment. In the 1-2 days after irrigation, the cultivated fields should be treated with the help of techniques in the affected area. Water retention is carried out 24 hours a day to prevent wastage of water. At

work, it is advisable to choose the right irrigation equipment, install them automatically, and install plumbing pipes or irrigation machines in level areas.

2. The distributor is subdivided into the irrigation streams coming to the station. With irrigation streams, 8-16 hectares of land can be irrigated in one area overnight. During the growing season, water flow can be continued and irrigated up to 150-200 hectares. 8-16 hectares of arable land are irrigated in the prescribed manner. Water is supplied in turn at the water distribution station in the event of a decrease in the amount of water in the source. Fishing is organized in 2-3 rounds. The distance to irrigate the field should not be more than 10-12 days and nights. The transfer of water from one horse to another must be carried out during the day.

3. The amount of water required at the distribution station is determined on the basis of the household water use plan. These water quantities are determined in accordance with the reclamation conditions of the lands and the water regulations of the source. This work is carried out by the Irrigation Systems Management Authority, the district water industry. During the period of reduced irrigation water, the amount of water required and discharged is reduced and limited.

During the development of agricultural crops, irrigation is provided to irrigators continuously from inter-farm streams, which simultaneously irrigates 150-200 ha of land. Among households, regular water use (water circulation) is established in the case of less watery systems. Alternative water use among households is introduced on the basis of the agreement of the district water management production.

4. In cotton-growing households, more water is supplied to the stream than irrigation systems. Technical crops are irrigated through caches, grain and fodder crops through strips. When treating longitudinal or horizontal treatment with the help of a tractor in areas where technical crops are planted, their productivity should not be less than 8-16 hectares irrigated overnight.

5. 5. The length of the caches of inter-cultivated crops should be 100-400 m, and the rate of water flow should be in the range of 0.05-0.6 l / sec. The length of the caches in the field, the amount of water supplied to a cache, and the duration of water retention may vary depending on the soil and climatic conditions of the farm.

As is well known, in waterlogged caches, the absorption of water into the soil occurs 2-3 times slower than the first irrigation. In order to catch water that is accustomed to clay soils, the caches have to be watered with a variable flow and at the end of the catchment the water supply has to be reduced by 2-3 times.

It is recommended that the soil with low groundwater levels and low water permeability should be watered regularly for 12-24 hours to achieve normal irrigation when coughing.

The normal humidity of the ridge soil is less dependent on the slope of the cache and the amount of water supplied to the cache, which also depends on the duration of water retention. Therefore, low-flow water is caught in the inter-row crop fields and its duration should not be less than 12-24 hours.

In clay soils, water absorption varies by 1.5-2 times at the end of the irrigation season, depending on the growing season and the amount of irrigation. It is recommended to change the lengths of the crops at the beginning of the growing season, shortening them at the beginning of the growing season, and at the end of the long ones, in order to achieve a better absorption of the catchment water into the soil.

It is not observed that the soil is shallow in sloping, sloping (spacing ± 5 ÷ 10 cm). Therefore, proper leveling should be carried out in these areas and water should not be allowed to flow back along the length of the cache. A 1.2-2-fold increase in the length of the cache leads to a 1.1-fold increase in the amount of lost irrigation water.

The water flow is distributed evenly if the heads (ears) that are discharged into the cache along the length of the coffins are covered with tubes, polymer films, and siphon-shaped pipelines. The

productivity of water loggers and water loggers is increased by 1.3-1.5 times. With the use of pipes or hoses, the quality of water retention in crops increases and ensures the normal growth of plants.

In recent years, advanced methods of irrigation have begun to be introduced into production. These include pipelines, openers, and motor pumps that provide automatic operation.

The following are the basic rules of perfect irrigation methods:

1. In order to irrigate the farmland at the same time, they are properly leveled and divided into 8-16 hectares and larger fields. When water is caught in that field, water is released to all streams, streams and irrigation caves at the same time. Fishing continues day and night. The watermen work mainly during the day, and at night the watchmen monitor the flow of water to the caches. The divers work in groups of 6-10 people. In the bright sun, the horsemen are getting ready to catch water. Transfer of water to another horse is carried out only during the day.

2. When water is caught, the flow of water is fed to the horse to a certain extent, continuously. The amount of water flow is determined by the following formula:

$$Q = \frac{m*\omega}{86,4*t}\text{ , l/sec}$$

here:

m - irrigation rate, m3 / ha;

w is the area of the irrigated horse at the same time, ga;

t - time to irrigate the field, day.

When the amount of water to be supplied per night is 800-1000 m^3/ha, the water flow to irrigate the field with an area of 8-16 ha is 75-185 l/sec. should be equal.

The flow of water is distributed to the stream, upstream, and to the irrigation cache. The length of the cache and the flow of water to the cache are determined by the crop rotation area.

Changes in the amount and flow of water should not be allowed when water is caught in the field, and if this rule is not followed, the

distribution of water across the caves will be disrupted, the soil will not be accustomed to moisture, and water loss will occur. Therefore, when catching water that is accustomed to the field, water retention should be carried out carefully.

3. The temporary shut-off during the catch-up period should only serve one horse. Then all the streams, discharges and irrigation caches will work equally. Temporary readings are divided into several subspecies depending on the amount of water flowing from them (20-50 l / sec). The caches in the upper (upper) part of the area are given an increased amount of water, from which the leaked water is used to irrigate the caches located in the lower (lower) part of the area. From the highest part of the area to the lower reaches, the caches can be drawn to the water horizon, the water capacity of such caches is 2-5 l / sec and the distance between them should not be less than 10-15m.

4. To improve the quality of water retention, it is necessary to ensure that the length of the caches is 150-250 m, the speed (amount) of water supplied to the caches is 0.05-0.6 l / sec, and the length of the cave is 200-300 m long. This allows for a certain amount of water retention at the top and an equal flow of caches. In addition, it is advisable to install a pipe (one pipe for 2-3 caches in a cotton field) in areas where water flows upstream and at the head of the cache. It is also required to perform all field work on a regular basis on a pre-determined basis.

Production studies have also shown that the efficiency of other field work on cotton care is significantly increased when adequate water is applied to cotton fields, including:

- increased coordination of field work, while increasing the volume of water catchment and treatment area;

- 18-20 days of weed removal, fertilization and embroidery on cotton fields were carried out in 8-10 days;

- the cost of manpower has been reduced by 15-20% due to the consistent conduct of irrigation and treatment equipment;

- Simultaneous intermittent treatment and reduction in the length of the canals and ditches increased the productivity of irrigation machines by 10-15%;

- Reducing the length of streams by pre-scheduled irrigation in agricultural areas increased the beneficial effect coefficient (PTK) of small streams by 10-15%;

- The amount of water loss has been reduced from 25-30 to 5-6%;

- the productivity of watermen increased from 0.3-0.6 ha to 1-2 g per day;

- improved irrigation quality;

- As a result of the normal growth of cotton, the creation of favorable conditions for harvesting, the yield increased to 3-5 s/ga.

This perfect method of irrigation - increases irrigated land productivity and productivity in irrigated agriculture. This is required in all households in irrigated districts.

In some households, the lack of irrigation mechanisms, the inequality of irrigation water, the low level of water management at night, and the lack of even distribution of water in the caves are some of the difficulties in using the perfect irrigation methods.

The change in the amount of water in the small canals during irrigation does not allow for a gradual change in the soil layer of the irrigated area and makes it difficult to irrigate large areas at the same time. For this reason, inadequate wetlands are being re-irrigated. They divide the water by the number of irrigation streams to properly irrigate the fields. The sequence of irrigated areas is then determined by the number of irrigation streams.

The farm has a water use plan for large agricultural areas (arrays) measuring 200-400 ha. The area is irrigated on the basis of several irrigation streams during the growing season.

In this area, a water use plan is developed at the same time as an irrigation-related production plan.

As a result of the large-scale farmland plan, a plan for the total water use of the farm's water-sharing points is being developed. The aggregate plan determines the amount of water per decade, taking into

account the water losses in the irrigated fields and distribution ponds of the large agricultural areas.

The water use plan for large farms consists of three calculated tables. Table 1 - Annual calculations of irrigation rates of agricultural crops for seedlings with an area of 20-40 ha. Table 2 consists of calculations of the amount of water required for irrigation of crops grown on large farms. Table 3 - Calculates the sequence of irrigated fields to be irrigated on large farms.

Calculations of the water use plan for large farms are carried out in the following order:

1. The amount of irrigation is determined by taking into account the agro-technical measures to be carried out on the farms of large farmland, the planned yield, soil conditions, groundwater levels, agroclimatic conditions and pre-sowing water levels.

2. The amount of water harvested and the amount of water required to irrigate the fields of large agricultural fields are determined by the amount of water to be irrigated. The amount of water is planned according to the size of the irrigation canals and the number of irrigation canals is determined according to the preferences. Irrigation flows are determined by the area accepted for irrigation overnight and the amount of water to be caught. The amount of water flow is taken into account, including the PTK of the streams and auxiliary streams in the large agricultural fields;

3. Calculations of the regular irrigation of the fields of large agricultural fields during the growing season of crops are determined. The timing and duration of each irrigation of these fields are set. In accordance with the treatment to be carried out, the order of irrigation of the fields is established. The timing of watering for each horse of large farmland is determined and a plan for the distribution of water flows in irrigation is drawn up;

4. To reduce the length of running streams at the same time, you must first select similar irrigated fields. It is estimated that with the proper organization of irrigation, the length of the streams is reduced by 25-30% and its usefulness coefficient (PTC) is increased. It is

necessary to agree on the distribution of irrigation streams between large farms. Irrigation flows to a large area are carried out at different times, except for one large area.

Irrigation should be maintained during irrigation, which in turn ensures that the irrigation system is maintained in a consistent and appropriate manner. The farm must have maps of irrigated land in a scale of 1: 10,000 or 1: 5,000 to plan and implement irrigation. For the reporting year, the maps should clearly indicate streams, saltwater streams, hydraulic structures, large farms, irrigated fields, tenant group boundaries, crop locations, water distribution points, roads, and forest areas. The household should be aware of the distribution and field flows that exist, and the computational sizes of the auxiliary shuttle PTKs. To increase the responsibility for the implementation of the water use plan in production, an agreement is signed between the district water management production and farms. The district water management unit is obliged to provide the required amount of water at each water distribution point within the stipulated time in accordance with the household water use plan. The farm, in turn, is committed to the use of water as planned, to prevent wastage of water, to improve irrigation techniques, to carry out post-irrigation treatments in a timely manner, and to use irrigation canals and facilities in a safe manner.

The amount of water used and used at least twice a day should be taken into account at each water distribution point in the household. The district hydroelectric power plant and the hydraulic engineering of the farm should note the amount of incoming and outgoing water. This treatment is the main document indicating the implementation of the water supply agreement for the water distribution point of the farm. In order to increase the accuracy of water distribution, water meters should be installed at water distribution points.

A certificate of the volume (quantity) of water received and distributed at the water distribution point is drawn up every decade. The certificate is signed by the district hydroelectric production and hydraulic engineering of the farm. The farm is calculating water charges on the basis of this document.

The District Water Supply Authority monitors the use of water in the farm. At the end of each decade, the hydraulics of the cycle, together with the hydraulics and agronomy of the household, analyze the implementation of the water use plan and evaluate the water use coefficient of the household in the decade.

1. The coefficient of water use of the household is determined on the basis of the ratio of the implementation of the irrigation plan for all crops and each crop area during this period (in Pfield%) to the implementation of the water supply plan at the water distribution point (Pwater%) at that time.

$$K_{s.u.} = \frac{P_{field}}{P_{water}}$$

The water use coefficient is close to 1 in good conditions.

2. The total PTC of individual parts of the domestic streams is determined by the following formula:

3. $\eta_{um} = \frac{M_{field.nt}}{M_{hak.br}}$

that is, the ratio of the total amount of net water to be given to the household on a ten-month or monthly basis to the actual amount of gross water supplied to the water distribution point. This coefficient determines the state of water use. Under good conditions Shum = ηhoj.akab.In this case only the main stream can have a leakage loss. If the total PTC size is low, the use of water in the household is considered to be not fully regulated and improperly organized and the increase in irrigation norms, the amount of water used and lost is allowed.

3. The equal distribution of water to each water distribution point of the household is assessed by the following indicators:

- implementation of the five-year water supply plan (Pwater = 0.95-1.05 under good conditions);

- the coefficient of water volatility in the fifth is Cv

$$C_v = \frac{\sqrt{\frac{\Sigma(Q_{hak}-Q_{ort})^{*2}}{n}}}{Q_{ort}}$$

Here:

Cv - water volatility coefficient;

Q_hak- the amount of water actually supplied at the water distribution point during the monitoring;

Q_ort is the average amount of water at the five-point water distribution point;

n is the number of observations made in the five.

When Cv = 0-0.1 - water supply is good;

When Sv = 0.1-0.2 - satisfactory;

When Sv = 0.3 - the water supply is considered unsatisfactory.

When the water level is 0.3, the amount of water lost in irrigation is 10-12% and the change in irrigation rate is also 10-12%. In this case, work should be done to ensure an equitable distribution of water in irrigation as soon as possible.

Irrigation work on the farm should be monitored by accurate measurement of the area of large farmland, including the actual amount of water supplied to a horse, the water loss of the stream, and the performance of irrigation techniques.

The control of irrigation of large farmland determines the quality of irrigation of the fields, the amount of water lost, the amount of water leaks in the facilities, the technical condition of the stream and the types of repairs to be carried out on it. The water use plan should accurately keep track of water, irrigation and crop treatment areas after flooding.

Conclusion

1. Turkmenistan has attached great importance to climate change and adopted the National Climate Change Strategy. The goal of the national strategy is to ensure sustainable development that contributes to the economic and social development of the country in response to the effects of climate change in Turkmenistan. Tasks coming from the national strategy require the sustainable use of water resources.

2. Developing and implementing a domestic water use plan for the sustainable use of limited water resources in climate change is one of the key tasks of the National Strategy for Climate Change.

3. Planned water use means compliance with the established legislative acts. Article 53 of the Water Code of Turkmenistan guarantees the right of land users to receive water shares according to the area of crops, types of crops and natural climatic conditions. According to this law, the water supply of the lands is carried out on the basis of the water use plan. A water use plan is a document that shows which crop, when, how much water, and how to irrigate. This document is developed by the water users themselves.

4. In accordance with Article 12 of the Water Code of Turkmenistan, water use plans for domestic, systemic, district, provincial and whole state water use are approved by the authorized state body.

5. In accordance with the Water Code of Turkmenistan, water users must develop an internal water use plan and approve it in the local water management institutions and establish a water use plan on the farm.

6. It is recommended to use a limited amount of water approved by the Ministry of Agriculture and Water Resources of Turkmenistan to determine when, how much water and how to irrigate crops on the basis of the domestic water use plan.

7. In the manner provided for in Article 41 of the Water Code of Turkmenistan, all water users must keep an accurate record of water use and equip all beams with water meters.

8. In order to encourage efficient use of water, it would be appropriate to include in the annual reports of households such indicators as “Yield per unit of water” and “Net income per unit of water”.

9. Article 110 of the Water Code of Turkmenistan provides loans and other benefits to legal entities and individuals in accordance with the legislation of Turkmenistan in the implementation of water-saving technologies in the economy and other effective measures for the

efficient use and protection of water resources. In accordance with this procedure, the state shall ensure the implementation of the major technical measures provided for in the domestic water use plan.

10. At the economic level, measures for the efficient use of water are divided into 3 groups:

The first group consists of activities that require high investment funds. These include concreting or overlaying the irrigation system of the farm, construction of underground water ducts, the use of rainfall and drip irrigation methods in production, the full planning of irrigated areas, and so on.

The second group includes organizational and technical measures that do not require investment. These include satisfactory maintenance of the irrigation system in the farm, observance of the irrigation procedure and method of agricultural crops, maintenance of the measurement and accounting of irrigation water, provision of water rotation, increase in soil moisture, increase in water conservation, water conservation, water evaporation, soil evaporation. activities such as the use of regulations and the improvement of water-related relationships between water suppliers and water consumers.

The third group is to establish permanent training centers, develop local agricultural advisory centers, bring the content of the country's water strategy through the media to the attention of the local population, and use water efficiently and effectively. and measures aimed at increasing the awareness of water users, such as printing, and the proper use of water resources.

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