

Water resources management on the level of Basin Management Boards of Irrigation Systems (BUIS) during the years of various water supplies

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Abstract

Agriculture in Uzbekistan is fully based on irrigation, and water, as the factor of output production, is used conjointly by the farmers. Over the last four years water sector reforming is taking place in the country.

Since 2003, in order to improve the organization of water resources management in the Republic of Uzbekistan and to provide a transition from administrative-territorial to basin principle of irrigation systems management, 10 Basin Management Boards of Irrigation Systems (BUIS) have been established instead of 230 hydro-economic operating organisations. Such changes have been conducted in order to separate water management from administrative-command governance of land and water resources. Thus, the Lower Amudarya BUIS was established within the low flow of the lower Amudarya River basin with its headquarter in the city of Takhiatash, Republic Karakalpakstan.

Under the influence of reforms conducted in the Republic the structural changes in water use on the low-level are taking place. Nowa-

days there are 216 thousand farmer estates in the republic. Every of these estates has to get irrigation water in time and has to be provided with water disposal system.

In order to control water resources and its fair distribution, Water User Associations (WUA) are created. The associations' members are farmers themselves, but during current transition period the associations are founded under strong supervision of the state and under the decisions of local governor offices-*khokimiats*. Thousands of farm enterprises were united into Water User Associations, which already operate more than 3, 7 million irrigated lands, under the decision of Commissions and farmers' general meeting minute, and also with the help of initiative support of state hydro-economic organisations.

Under these circumstances, in order to organize water supply and water use, it is necessary to develop and operationally realize new approaches to such services as water delivery and allocation. These are juridical, organizational, economical and technological actions.

Over the period of its existence, the stuff of BUIS has already come across with the work of water user systems not only in context of sufficient water quantity but also under restriction. Due to assumed lack of water during the current vegetation period of cotton plants, in 2007 a range of measures, concerning an improvement of recording and usage of limited water resources and water preservation in the systems has been conducted in the system of Lower Amudarya BUIS. Lack of water in Central Asia is cyclical and threatens the economy with immense yield losses especially when specialists and water users are not prepared.

Despite of rainy April and reservoirs' refilling, the specialists of the republic Hydrometeor service have forecasted that in 2007 during the vegetation period water resources deficit, in the volume of 20-30%, is expected. Carrying out of the corresponding operational and planed preparative actions enables to increase the discipline in water usage.

According to Pahl-Wostl, examination, observation and uncertainty dealing (such as frequency increase of floods and droughts) that are connected with global changes, have to become the components of the future water resource management strategies (Pahl-Wostl, 2002). What does the preparation to water lack or abundance consist of after the basin management approach in Uzbekistan and especially BUIS was established (introduced)? Has the preparation been changed in comparison with previous structures based on the administrative-territorial principle? What does the practical experience of the water lack consequences' overcoming consist of? What is the role of public control? What suggestions, on the preventative measures against the deficit of irrigation water, do exist? Are water preserve technologies being introduced? How are the issues on trans-boundary level of water lack or abundance solved?

The article will combine a unique practical experience in the solutions of such questions as:

- 1) effectiveness increase in water resources allocation and usage in Lower Amudarya BUIS under the conditions of agro- and water estates reforming;
- 2) theoretical analysis of world investigations on uncertainty and adaptive management of water resources.

As the frequency of droughts and floods are unpredictable in Central Asia, the question of water preservation is of current issue. This question has to be solved not only on the level of BUIS and UIS, but it is more important to organise the water preservation on the lowest level of WUA and common water users. On the other hand, it is necessary to exert every effort in order to organise clear management of water resources on all levels of hierarchy, starting with a basin and coming to every small water drainage, because the main losses are normally found at the interfaces.

The article will be concluded with an analysis of the current situation in providing the efficient and purpose-oriented usage of limited water resources and in the reduction of expected droughts in 2007 under the new conditions of basin management of irrigation systems (in Lower Amudarya BUIS).

Introduction

Agriculture in Uzbekistan is fully based on irrigation, and water, as the factor of output production, is used conjointly by the farmers. Over the period of last four years water sector reforming is taking place in the country. A change in the structure of water management in the lower level is taken place under the influence of conducted reforms in the Republic. Nowadays there are 216 thousands of farm enterprises in Uzbekistan, each of that have to receive in time irrigation water and to have provided water disposal.

In order to control water and its fair distribution, water user associations (WUA) are created by the farmers who are the members of WUA. Although in the current transition period such associations are set up not by the farmers personally but with the initiative help of state water organisations. Nowadays according to the data of the Ministry of Agriculture and Water Resources more than 170 thousand of farms are united into 1654 Water User Associations (WUA) which operate on the irrigated land of 3, 7 million ha [(MAWR 2007)1](MAWR 2007).

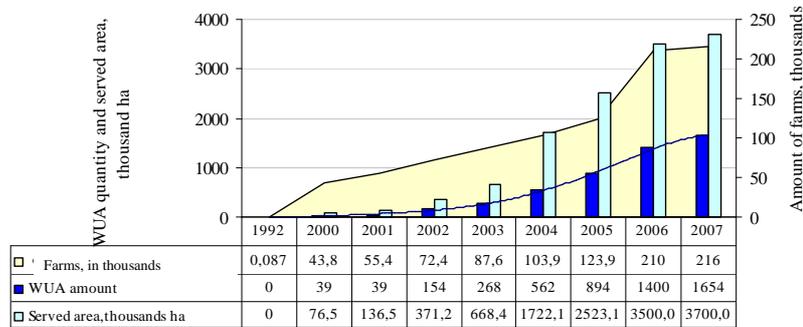


Fig. 1 Growth dynamics of WUA amounts and of the amount of irrigated areas, served by them

To organize water supply and use under such circumstances it is necessary to develop and operationally implement new approaches toward the services on water delivery and distribution. These are legal, organisational, economical and technological activities.

Since 2003, in order to improve the organization of water resources management in the Republic of Uzbekistan, which provides a transition from administrative-territorial to basin principle of irrigation systems, 10 Basin Management Boards of Irrigation Systems (BUIS) were established instead of 230 hydro-economic operating organisations. Such changes have been conducted in order to separate water management from administrative-command governance of land and water resources. Thus, the Lower Amudarya BUIS was established within the basin of the lower Amudarya River with its headquarter in the city of Nukus, Republic Karakalpakstan.

Over the period of its existence, the stuff of BUIS had already come across with the work of water user systems not only in context of sufficient water quantity but also under the circumstances of the dry season which was expected in 2007.

Lack of water in Central Asia is cyclical. Rural and water economies of the region had not once come across and are still facing the problem of lack of water. That is why the region has sufficient practical experience in negotiating of the consequences of lack of water, particularly through strengthening not only state but also public control and through the implementation of additional measures in material incentives of specialists and workers. Additionally, there is a decrease in watering frequency of main agricultural crops within the framework of existed technologies which is taking place not at the expense of volume and quality of the yields.

Wherein does the preparation to water lack/abundance consist after the established basin management approach in Uzbekistan and especially BUIS? Has the preparation been changed in comparison to previous structures that had been founded on the administrative-territorial principle? Wherefrom does the practical experience of the water lack consequences' overcoming consist? What is the role of

public control? Which suggestions, on the preventative measures against the deficit of irrigation water, do exist? Are water preserve technologies introduced? How are the issues on trans-limited level of water lack or abundance solved?

In order to answer all these questions in details, the current article covers a unique field experience of the Lower Amudarya BUIS which was gathered under the conditions of agro- and water estates reforming in Uzbekistan. The article also shows theoretical knowledge of world investigations on uncertainty and on adaptive management of water resources. As the frequency of droughts and floods are unpredictable in Central Asia, the question of water preservation is of current issue. This question has to be solved not only on the level of BUIS and UIS, but more important is to organise the water preservation on the lowest level of WUA and common water users. On the other hand, it is necessary to exert every effort in order to organise clear management of water resources on all levels of hierarchy, starting with the main channels of a basin and coming to every small water drainage of a farm, because the main losses are normally could be found at the interfaces.

The article finally ends with an analysis of the current situation on providing the efficient and purpose-oriented usage of limited water resources and on the reduction of expected droughts in 2007 under the new conditions of basin management of irrigations systems (in Lower Amudarya BUIS (NABUIS)).

Theoretical base

Problems of water usage and of access to clear water have a global character. According to Pahl-Wostl, examination, observation and uncertainty dealing (such as frequency increase of floods and droughts) that are connected with global changes, have to become the components of the future water resource management strategies [(Pahl-Wostl 2002)2].

Water management under risk of natural phenomena such as floods or droughts requires certain level of adaptation and adaptive capacity. Also an assessment of the vulnerability levels assists in identification of policy option for intervention.

Under adaptation Adger (1999) understands social vulnerability as the exposure of groups or individuals to stress as a result of social and environmental change, where stress refers to unexpected changes and disruptions to livelihoods [(Adger 1999)3]. Reilly and Schimmelpfennig (1999) describe the term vulnerability as a probability weighted mean of damages and benefits and give examples of yield vulnerability, farmer or farm sector vulnerability, regional sector vulnerability, regional economic vulnerability, and hunger vulnerability [(Reilly and Schimmelpfennig 1999)4]. IPCC (2001) defines vulnerability as a function of the character, magnitude and rate of climate variation to which a system is exposed, its sensitivity, and its adaptive capacity [(IPCC 2001)5].

Although the definitions come from the different disciplines, they cover natural as well as human system.

Apart of mitigation measures, society has to prepare for and adapt to the consequences of some inevitable climate change.

Adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities IPCC (2001). For this article, adaptation “refers to policies, practices and projects which can either moderate damage and/or realise opportunities associated with climate change” [(Agency 2005; EEA 2005)6]. Usually, adaptation measures and activities are taking place in the countries’ level, often in the contexts of natural hazard prevention, environment protection, and sustainable resource management. These measures are initiated on an ad-hoc basis. These measures are usually initiated with a sectoral view (e.g. water resource management) and implemented by different sectors and organizations (e.g. local authorities) [(Agency 2005; EEA 2005)6].

Of course, both vulnerability and adaptation depend on particular context and scale. Climate change adaptation progress has a number of challenges starting from climate change models and scenarios through involvement of public and private sector to collaboration between countries to ensure connection of adaptation measures with other policy objectives.

Adaptive capacity can be defined as the potential or capability of a system to adjust, via changes in its characteristics or behaviour, so as to cope better with existing and future stresses [(Pahl-Wostl 2007)7]. More specifically, adaptive capacity refers to “the ability of a socio-ecological system to cope with novelty without losing options for the future”[(Folke, Carpenter et al. 2002; Folke C 2002)8] and “that reflects learning, flexibility to experiment and adopt novel solutions, and development of generalized responses to broad classes of challenges” [(Walker, Carpenter et al. 2002)9].

This article shows adaptation measures in Uzbekistan based on analysis of governmental documents and interviews with water practitioners and water users. Progressively occurring circumstances of lack of water and droughts in Uzbekistan are forcing to develop adaptive capacity and to react enough in short time on the changes of natural water content years.

Discussion and conclusions

In spite of the forecasts of the specialists of hydro-meteor service, it seems that Uzbekistan is not ready enough towards lack of water which causes immense damage to the economy of the Republic.

The specialists have forecasted that there would be a deficit of water resources in agriculture with the rate of 11-15% despite of rainy April 2007 and reservoirs' refilling. 27th April 2007 the President of Uzbekistan has signed the Decree № IIII-629 for the purpose of the rational and object-oriented supply of the usage of limited water re-

sources and for the purpose of a mitigation of expected lack of water [(Government 2007; Uzbekistan 2007)10].

Such directives from the President of the Republic of Uzbekistan give instructions about measures, which were approved by the Government. Adaptation strategies and measures have been given similar importance as mitigation strategies. The presidential regulation sets out the framework and responsibilities for adaptation measures to be developed and implemented e.g. by the relevant sectoral ministries: Ministry of Agriculture and Water Resources and State Energy Company “Uzbekenergo” for adaptation measures in water reservoir management. A vulnerability assessment was prepared presenting the main vulnerable regions and sectors in Uzbekistan. These actions may be used as input to the development of climate change adaptation strategies.

More adaptation strategies are described as follows:

Wherein does the preparation to water lack/abundance consist after the established basin management approach in Uzbekistan and especially BUIS?

- all reservoirs in the Republic are transferred into the irrigational operated mode (concerning Ministry of Economy of the Republic of Uzbekistan, Ministry of Agriculture and Water Resources of Uzbekistan, State Energy Company “Uzbekenergo”)
- It is forbidden to sow rise (shali) during the years of expected lack of water. The distribution of rise sowings (shali) and double crops sowings on the other territories is carried out taking into account their supplies of water resources as agreed with Government committee on mitigation of expected lack of water and at the suggestion of the Ministry of Agriculture and Water Resources of Uzbekistan, Council of Ministers of the Republic Karakalpakstan and khokimijats¹ of provinces.
- Government Committee in association with the Council of Ministers of the Republic Karakalpakstan and khokimijats of provinces are developing and setting up in a period of seven days an activity list for every

¹ Office of governors

object. These activities have to provide implementation of events on mitigation of expected lack of water.

- In the context of the transition from administrative-territorial to basin principle of management the creation of BUIs was a turn for a better. As a concrete example of NABUIS shows: operational efficiency of water management has been improved, bureaucratic barriers and interference of incompetent people on water resource management have been decreased. Executive staffs of NABUIS and its subordinate organisations have been selected on a competitive basis. The rest line personnel have been chosen on a basis of interviews and certifications.
- An immense work on the providing of such equipments as water-regulated facilities and water-meters was conducted. This has enabled to improve management, distribution and record accuracy of water. Finally, farmers have obtained the conditions which are lightening solutions to the question of water supply.

Nevertheless, in spite of such advantages, there are several disadvantages and difficulties concerning the activities of Lower Amudarya BUIS. These are insufficiency in the experience of water resource management by BUIS, insufficiency of legal bases, poor technical equipment, lack of automatics and teleautomatics. Domination of the users of agriculture in the consumption (and in management) of water resources, i.e. absence of IWRM, can be added to the disadvantages.

Wherefrom does the practical experience of the water lack consequences' overcoming consist?

Concerning BUIS a program of events on mitigation of expected lack of water was set up. This program foresees water savings with 20-30% at the expense of internal resources. The events conclude such as additional cleaning of channels, utilization of collector-drainage water for irrigation, additional installation of pumping stations and particularly decreasing of rise areas, reduction of watering repetitions.

A control over the determined limit of water and over the schedule of water cycle is also provided. There is an assignment of responsible persons from water management organisation in order to organ-

ise and to control the realisation of the program in every association (WUA), system (UIS), district and farm.

Irrigators from different farms have been appointed according their family names and prepared beforehand. These people are occupied in cotton and wheat watering. All necessary conditions and material incentives have been established for them.

Demonstrational seminars on cotton watering were conducted in every district. Night watering was recommended and applied. Programs about rational water use were created and showed in cooperation with the local television (TV). Information about water supply was regularly and extensively reported in the local periodicals and newspapers, the articles about water supply were published.

What is the role of public control?

Implementation of the system of public control over the distribution and usage of irrigation water, efficient water use from deferent collectors, additional material and moral incentives not only for irrigators but also for the other participants of the main stage of vegetative work of cotton growing are the immense benefits. Mass media is focused on the propaganda and agitation of the rational usage of irrigation water.

Which suggestions, on the preventative measures against the deficit of irrigation water, do exist?

Majority of the proposals, which were referred toward preventive measure against the deficit of irrigation water, have been taken into account and even have been implemented. This could be seen not only on the fields of most farms but also on the fields with irrigated systems. At a farm scale, special attention has to be paid on labour conditions and leisure facilities. Irrigator is a very important figure under conditions of water deficit. To a large extent, cotton yield depends on a willingness of irrigator to work effectively. Therefore it is necessary to be ready toward the beginning of watering on cotton areas well in advance.

Moreover, it is essential to pay heightened attention to important components of intensive technology such as cultivation and chiselling. That would allow to decrease evaporation of moisture from the soils and to save water due to restrictions of cotton watering during the season (three instead of four).

Established mutually beneficial relations between farms and water usage associations are very important. By this it is meant that all farms, which had entered into the contract of water use, are using rationally set up limits of irrigational water.

Are water preserve technologies introduced?

Expecting lack of water, a great attention was paid to cleaning of collector-drainage network, of main irrigated channels and of irrigating ditches, to the repair of constructions on irrigated networks. Slicing of additional irrigating ditches with the length till 40-50 meters and an increasing of the frequency of cultivation and chiselling have an immense effect.

How are the issues on transboundary level of water lack or abundance solved?

One of the causes of spring disasters on the rivers of central Asia is a poor excessive regimentation of river outflow. Due to the lack of water reservoirs with corresponding capacity, Uzbekistan and its neighbour lands are not able to hold superfluous winter outflow and afterwards its rational usage during the summer.

It is essential to accept urgently a special program on the creation of strategic stocks of water. Therefore, Central Asia has all conditions: superfluous winter outflow of trans-limited rivers, which middle-Asian lands still cannot cope with, natural underground capacities and finally scientific-technical potential, which is concentrated (or rather dispersed one) in leading science and learning centres of the countries. Watermen, geologists, hydro-geologists and ecologists not only can but also have to unite their efforts on the solution of this

extremely important problem for the life necessities of the future generations.

The paper summaries adaptive measures in the Republic of Uzbekistan and is based on an example from a Sub-basin of Amudarya river. With respect to severe draught in 2000-2001 occurred in Uzbekistan, which more or less sapped and shocked unprepared population of Uzbekistan, the above-mentioned policies, practices and projects that can moderate damage from climate change are realistic measures and do not remain on the paper only. Some of the measures are still the suggestions such as, for example, implementation of a special program on creation of strategic stocks of water.

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