Environmental Protection of

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RIVER BASIN MANAGEMENT PLAN

FOR THE CENTRAL KURA BASIN DISTRICT OF AZERBAIJAN

Prepared a consortium led by SADIG LLC

in cooperation with

Azeri branch of REC Caucasus, HSRI and PERIOD LLC

Baku, December 2015

CONTENT

ABREVIATIONS

1. ADB-Asian Development Bank
2. RBD- River Basin District
3. BOD – Biological Oxygen Demand
4. CIS –Common Implementation Strategy
5. COD – Chemical Oxygen Demand
6. DO – Dissolved Oxygen
7. EC – European Commission
8. EQS- Environmental Quality Standards
9. EPIRBP – Environmental Protection of International River Basins Project
10. EO-Environmental Objectives
11. EU – European Union
12. GDP – Gross Domestic Product
13. GIS – Geographic Information Systems
14. GWBs – Ground water bodies
15. HMWBs - Heavily modified water bodies
16. HPPs – hydropower plant
17. HSRI - Hydrometeorology Scientific Research Institute
18. IRBMP- Integrated River Basin Management Plan
19. IWRM- Integrated Water Resources Management
20. JFS- Joint Field Survey
21. MAC – Maximum Allowable Concentration
22. MENR- Ministry of Ecology and Natural Resources
23. NCC- National Coordination Committee
24. NGO-Non Governmental Organization
25. O&M- Operational and maintenance
26. OSCE- Organization on Security and Cooperation in Europe
27. PA- Protected Area
28. PoM – Programme of Measures
29. RBMP – River Basin Management Planning
30. REC – Regional Environmental Centre for Central and Eastern Europe
31. SIDA – Swedish International Development Agency
32. SM – Surveillance monitoring
33. SWBs – Surface water bodies
34. SWBR – Surface Water Body at Risk
35. UNECE – United Nation Economic Commission for Europe
36. ToR- Terms of Reference
37. UNDP – United Nations Development Program
38. USAID - United States Agency for International Development WFD
39. WBs – Water Bodies
40. WBRs – Water Bodies at Risk
41. WFD – Water Framework Directive

EXECUTIVE SUMMARY

Introduction and acknowledgements

This draft RBMP for the Central Kura Basin District (BD) was prepared by the consortium led by the SADIG LLC, in cooperation with the REC Caucasus, SHMI and PERIOD LLC, under the consultancy assignment commissioned by the Hulla & Co. Human Dynamics KG, for development draft River Basin Management Plan for a selected pilot basin in Azerbaijan, as part of the EU funded project "Environmental Protection of International River Basins"*(SC № 2011/279-666, Europe Aid/131360/C/SER/Multi)*..

This assignment entails for preparation of a draft River Basin Management Plan consistent with the EU Water Framework Directive and national legislation of Azerbaijan, also to be aligned with the approach used by the Environmental Protection of International River Basins Project (EPIRB).

Water Code of Azerbaijan Republic considers integrated ecosystem approach as part of the water management policy, however no legislative act exists that describes mechanism for application of the basin management principles. Currently Azerbaijan is planning to harmonize the national water legislation with the EU directives. One of the specific objectives of the EPIRB includes development of draft RBMPs for selected pilot river basins according to the EU WFD requirements therefore the WFD planning cycle is used as the basis, keeping in mind that the water legislation of Azerbaijan does not contradict to the logics of the WFD compliant planning cycle. The main objectives of EU Water Framework Directive is to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one km from shore) and to prevent deterioration and ensure the conservation of high water quality where it still exists. The main goal of the Central Kura pilot river basin management plan also is to achieve environmental objectives of the WFD through implementation of necessary measures.

The Central Kura RBMP is aimed at introduction of WFD methodology to increase knowledge of relevant national and regional organizations on water resources management and protection and increasing of their capacities to develop RBMPs according to requirements of the Directive

During the development of River Basin Management Plan for the Central Kura BD the below tasks have been implemented:

- Classification of water bodies based on available biological and chemical data;
- Identification of pressures and impacts and water bodies at risk. Identification of significant pressures and the related possible risks of each water body to fail the WFD environmental objectives, aligned to the EC IMPRESS WFD guidance document (Article 5, Annex II);
- Setting of environmental objectives (WFD Article 4);
- Design of surveillance and operational monitoring programme and network (Article 8, Annex V) included as an Annex to the RBMP;
- Identification of gaps in data availability and design of investigative monitoring programmes and network;
- Assessment of water status (surface water and groundwater) using available biological, chemical and quantitative data;

- Revision of water body status based on outcomes of investigatory monitoring (JFS);
- Initial economic analysis consistent with the WFD guidelines (WFD Article 5, Annex III);
- Development of national and basin-wide confined Programme of Measures (WFD Article 11, Annex VI); and
- Preparation of a River Basin Management Plan in accordance with the WFD and national regulations (WFD Article 13, Annex VII)
- Discussion of Draft RBMP with stakeholders and public and when finalizing of document. taking their comments into account

The overall delineation of surface water bodies, the typology of the newly delineated, water bodies was carried and in the classification of the water bodies was used the results of water quality monitoring conducted by the EPIRB project.

Central Kura Basin District RBMP is aimed at achieving the environmental objectives for waters. According to WFD all water bodies are required to have at least good ecological status. In this regards to achieve good status has been developed PoM for water bodies at risk and other water bodies.

İn this regards the project Team of the consortium expresses its gratitude to Mutallim Abdulhasanov, Matanat Avazova, Pasha Karimov and Asif Verdiyev form MENR, Arif Akhundov , Elnar Sultanov , Sahib Hasanzadeh and Jamshid Mammadov from Water Resources State Agency of Ministry of Emergency Situations, Altay Jafarov from MoEİ, Shamil Husseynov from Committee on Natural Resources, Energy and Ecology of National Parliament, Mamamd Asadov and Teymur Osmanov from Amelioration and Water Farm JSC Ahmad Mammadov and Arzuman Bayramov from Azersu JSC and independent experts Farda İmanov, İslam Mustafayev, İsa Aliyev, Ramil Huseynov, Vafadar İsmayılov, Telman Zeynalov, Farid Garayev for their help to prepare the RBMP, to Amin Mammadov and Leyla Verdiyeva for translation of draft RBMP in Azeri language and finally to CWME of EPIRB project Rafig Verdiyev for his advises provided during the development of RBMP .

The Central Kura BD

The Central Kura pilot river basin is located in the Ganja-Gazakh Economic Region at western part of Azerbaijan and covers Agstafa, Dashkesen, Gadabay, Goranboy, Khanlar, Gazakh, Samukh, Shamkir, Tovuz administrative regions, cities like Ganja and Naftalan. Economic region has suitable economic – geographical location. It is located on the North – eastern slope of Lesser Caucasus mountainous massive, has border with Armenia in South – West and with Georgia in the West and North of the region. Region covers the area of 12 500 km2 (14.4 % of the territory of the Azerbaijan Republic). The territory of the region can be divided into zones considering its landscape characteristics: lowland area with some slope to the direction Kura river, foothill zone, middle highland (1000-2000 m a.s.l.) zone and alpine zone (more than 2000 m a.s.l) /36/.

Rivers of the region are running from Lesser Caucasus to the Kura River Plain. Main rivers of the area are: Agstafachay, Tovuzchay, Asrikchay, Zayamchay, Shamkirchay, Ganjachay, Kurakchay, Tartarchay which flow into the Kura River directly or into the reservoirs over the Kura River/(Sources:Rustamov S.G., Kashkay R.M. Water resources of the rivers Azerbaijan SSR, 1989) .

For the purpose of the RBMP development, the pilot basin was subdivided into several sub basins and taking into account volume of work and time limitations 4 main river basins (Ganjachay, Shamkirchay, Tovuzchay and Agstafachay) located in area between Ganja and Georgian border as it is shown in Figure ES-1 below .

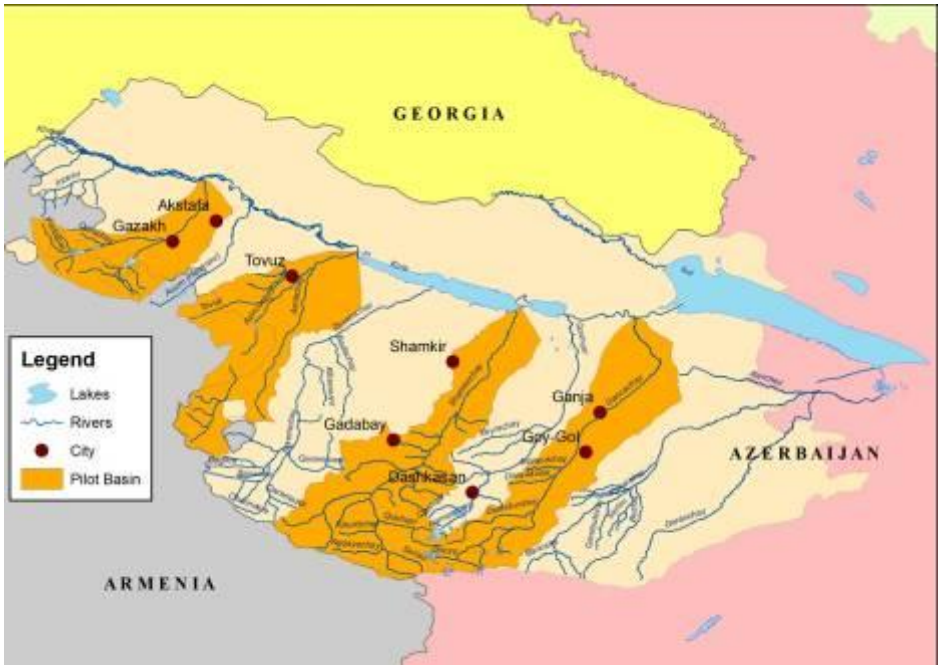

Figure ES-1. Central Kura RBD map

The overall goal of the RBMP is to protect surface and ground waters of the Central Kura BD from significant antropogenic (pollution and hydromorphological) pressures through attaining a number of environmental quality objectives designed to reduce/eliminate significant water management issues in the pilot river basin.

Identification and Delineation of Surface and Ground Water Bodies

For each Water Body, discrete sections, which differ from each other in specific natural characteristics, the nature of the human pressures and/or impacts, or any other specific parameters identification of the types was based mainly on geographical and morphological character.

On the basis of the ecoregion and Geology all rivers in the Central Kura BD belong to one single type, meanwhile by the Altitude factor and the Catchment size rivers fall within 7 groups. Surface water bodies are classified into water bodies in natural conditions, heavily modified and artificial water bodies. Determination of surface water bodies and heavily modified water bodies is based on several guidelines and an agreed methodology, is described below.

Fifty three surface water bodies have been identified on the rivers of the Central Kura BD. Five water bodies (irrigation canals) have been identified as the artificial water body. Four lake water bodies are located on the territory of the pilot basin. Two of them (reservoirs) have been identified as the heavily modified water body.

Totally 7 groundwater bodies (G-100 - G-700) have been preliminary identified and delineated in Central Kura BD. Four groundwater bodies have been identified in the Quaternary aquifers, of them one is

unconfined and three confined (artesian) and three groundwater bodies delineated in Pre-Quaternary aquifers All groundwater bodies are of good chemical and quantitative status and all of them are used for water supply to a various extent.

Water Management Issues. Significant Pressures and Impacts

Based on the IMPRESS methodology as well as findings of the updated river basin analysis study in total 15 water management issues were identified for the Central Kura RBD. They are related to pollution from point and diffuse sources and hydromorphological alterations. Then identified water management issues were analyzed and prioritized and as result 9 significant water management issues were selected.

Significant water management issues for the Central Kura Basin District

	Water management issue
1	Untreated wastewater discharges from urban sewer systems (or combine sewer systems that means both urban and industrial)
2	Untreated wastewater discharges from industries
3	Loads of agricultural fertilizers
4	Disposal/dumping of solid household wastes
5	Sand and gravel extraction
6	Water abstractions for irrigation
7	Water abstractions by water supply systems
8	Water abstractions by HPPs
9	River regulation: damming, channelling, flow regulation

For all water categories, addressed all pressures, including:

- Point source pollution
- Diffuse source pollution
- Pollution by hazardous/priority substances
- Hydromorphological alterations including all pressure types as listed in the EPIRB Guidance Document

Pressures and impacts were been identified in more details at the water body level following guidance provided by the EPIRB project. EPIRB report on classification of groundwater bodies was used for identification of groundwater bodies.

According to EU WFD CIS Guidance Document No.3 pressures and impacts have been analyzed within the characterization of water bodies according to article 5(Source: EU Water Framework Directive, (2000/60/EC), European Communities, 2000)..

Abstractions of water for irrigation and other use, water pollution and morphological alterations have been identified as main sources of significant pressure in the Central Kura Basin District, which was based on information and data on range human pressures and impact as well as their significance.

Point and non-point pollution sources and their impacts were reviewed, based on the information on total loads measured or licensed, hydromorphological alterations for water bodies /areas at risk were identified and compared both with the existing national legislation and WFD.

In the RBMP have been described accordingly non-point pollution sources and climate change impact to water resources

Surface Water Bodies "At Risk" and "Possibly At Risk"

Detailed pressure and impact analysis played important role for:

- Identification of Significant Water Management Issues and more precise assessment of basin wide threats to surface and ground water status
- By support of EPIRB project establishment of risk criteria to assess/estimate the possible risk to achieve the WFD environmental objectives
- GIS mapping of water bodies and water body groups at risk
- Assessment of protected areas

Significant pressures were been selected by use of EU WFD CIS IMPRESS guidance based on the existing water monitoring data and the results of pressure impact analyses.

Identification of water bodies has been carried according to EU WFD CIS Guidance Document No.2(EU Water Framework Directive (2000/60/EC) Common Implementation Strategy, Guidance Document no 2, "Identification of Water Bodies", European Communities, 2003;).

For each significant pressure have been identified WBR.

During the assessment of 48 delineated river SWBs, 2 SWBs at risk located in the same river segment have been merged in one water body at risk (for example 13-5-WB44R and 13-6-WB45R on Ganjachay river). Therefore the total number of natural water bodies have been reduced from 48 to 44

Of the 44 river water bodies 15 WBs are at risk(WBR) of not achieving good ecological status and 5 WBs possibly at risk.

All above studies helped:

- Further identify measures to achieve the environmental objectives for the identified water bodies, and particularly the WBRs.
- Design of surveillance and operational monitoring programmes and networks based on the risk assessments
- Identification of data gaps and proposals for investigatory monitoring for inclusion in Joint Field Surveys

Based on the available data and information (JFS 1 and 2 and national monitoring programme) and using the methodology described in the *"Guidance Document addressing hydromorphology and physic-chemistry for a Pressure-Impact Analysis/Risk Assessment according to the EU WFD"* the following can be concluded:

- 15 Surface water bodies were identified as “at risk”;
- 5 surface water bodies identified as possibly at risk(WBPR)”;
- 3 water bodies (2 lake WBs and 1 river WB) have been identified as heavily modified surface water bodies;
- 5 water bodies identified as artificial WBs;
- Regarding the groundwater bodies all of them were identified as “not at risk”.

Protected areas and programs of measures for protected areas are described in Central Kura RBMP

Environmental objectives for ecosystems in protected areas are the conservation and sustainable use of their resources.

Programmes of monitoring

Monitoring programmes and networks for surface and ground waters have been prepared, which include:

- Surveillance, operational, investigative monitoring
- Assessment of water status and confidence levels

The two key environmental objectives of the Water Framework Directive (Directive 2000/60/EC; WFD) for surface waters are:

- to prevent deterioration of the status of all bodies of surface water;
- Achieving good surface water status.

The status of surface waters is determined by both its *ecological* status and its *chemical* status.

The structure and content of this monitoring programme as the outcome of the activities conducted under the EPIRB Project and part of the River Basin Management Plan s for the Central Kura Basin District have been presented in this chapter.

Environmental Objectives and Exemptions

Setting environmental objectives and planning their achievement are the basis to design appropriate measures as part of the Programme of Measures.

In the RBMP are determined environmental objectives and exemptions for water bodies for:

- Achieving good status for all water bodies;
- Prevent deterioration of water status;
- Ensure sustainable water management;
- Meet specific requirements for protected areas.

Setting environmental objectives for surface and groundwater bodies has an important role within the river basin management planning process.

For 14 WBs of 15 WBR and for 3 WBs of 5 WBPR have been established environmental objectives.

In RBMP the Programme of Measures to achieve the selected environmental objectives are developed. For WBs at risk and possibly at risk basic and supplementary Programmes of Measures have been identified to achieve environmental objectives:

Base approach is defined in article 11 of WFD in relation to development of PoM in the basin and at national level to prevent deterioration of the status of all bodies of surface water, achieving good ecological status and good ecological potential of artificial or heavily modified water bodies and protect, enhance and restore all groundwater bodies .

Programme of Measures includes basic, supplementary and support measures, economic analysis of these measures and, their prioritization based on cost, environmental and technical criteria in line with WFD Article 5, Annex III(EU Water Framework Directive, (2000/60/EC), European Communities, 2000;).

For protected areas 2 PoMs have been identified. Both are about conducting of study for checking of compliance of management of already existing protected areas to the international standards. The second one is about to conduct study to check if measures to be taken in protected areas (newly identified as drinking water sources) will also meet international requirements.

For all 15 WBR and 5 WBPR programme of measures or exemptions have been identified in the RBMP.

In total 16 basic and 15 supplementary measures have been identified in Central Kura BD. After prioritization of identified possible measures 8 high priority basic measure and 9 high priority supplementary measure have been selected in the RBMP.

Below are given selected supplementary measures in the Central Kura BD

Administrative measure: Creation of BMO and RBC

Main activities:

- To develop proposal on possible options and cost of creation and maintenance of basin entity in the Central Kura River Basin District.
- To develop proposal on needed legislative adjustments for implementation of RBMP
- To develop actions on stepwise approach required for implementation of RBMP according to EU WFD
- to cooperate with other relevant regional divisions of MENR and also Water Resources State Agency, Azersy, Amelioration JSC and other relevant organization to provide basin wide integrated water use and management.

In cooperation with other relevant regional divisions of MENR and also Water Resources State Agency Azersy, Amelioration JSC and other relevant organization to provide proposals on needed steps for basin wide integrated water use and management.

This PoM is planned to be implemented in the Central Kura BD during 2016-2021

Efficiency Water Supply and Sewage system management in large settlements at district level

Main activities:

- To identify sources of drinking water for secondary settlements and construct centralized water supply systems where it is economically feasible.
- To prepare proposal on the sewage systems(connection to existing or creation of new)

The sewerage works have high construction, and operating costs, in cases of communities with low population density or in isolated communities where connection seems unfeasible. Therefore, the construction and operation of the projects presents many difficulties when it is undertaken by the small settlement level branch on sewage management given the lack of technical and organizational infrastructure.

Project is planned to be implemented for large settlements in the Central Kura Basin District during 2016-2021

MENR can involve to the project Azersu JSC, Local authorities and other organizations in the basin district.

Economic and fiscal measures

Main activities will be to develop needed supplementary measures aimed in strengthening of cooperation among MENR and with relevant regional divisions of Amelioration JSC to promote the rational management of the irrigation water based on criteria of economic efficiency, environmental sustainability and equality, including :

- Establishment of the "Water Fund"
- Subsidies for reduced use of irrigation water
- Awareness campaigns for the rural population
- Provision of penalties / fines for over abstraction
- Establishment of system of water abstraction management to control of fulfillment of environmental flow requirements
- Apart from the above the system of tradable permits can also be examined,

Project is planned to be implemented in the Central Kura Basin District during 2019-2020

MENR can involve to the project implementation Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others

Emissions control measure

Main activities to develop emission control measures in the Central Kura River Basin District are:

- Develop provisions on possible emission control measures to strengthen the pollution control in the basin.
- Develop system of a combined approach on the reduction of pollution at source by setting emission limit values and set targets for water quality in different water bodies. When establishing the emission limit values should be provided relevance with EU and national law, and among other directives, with the Directive on Integrated Pollution Prevention and Control (IPPC) and the Directive on urban

wastewater treatment. Provisions to increase the capacity of relevant authorities in the basin district to have adequate legal powers and resources to:

a. Identify and monitor all kinds of discharges in the basin

b. issue permits for discharges and enforce the terms of licenses and control compliance with the provisions of the waste water discharge permits

c. take measures to prevent pollution either by the imposition of protection zones or through control of activities which could have adverse effects on water status.

d. implement supplementary measures for those specific circumstances where Environmental Quality Standards are not met, despite the application of limit values that are specified in the basic measures.

Project is planned to be implemented in the Central Kura River Basin District during 2016-2021

MENR can involve to the project Water Resources State Agency, MoH, Azersu JSC, Local authorities and basin organizations in basin districts and others

Demand management measures

Main activities:

Develop demand management system based on which include measures related financial, communicational, legislative and administrative, and technological aspects ofsustainable use of water. Develop recommendations will be to raise public awareness on issues of water resources management**.** Particularly for domestic use, public awareness activities will concern:

- Organizing awareness weeks with presentations and related workshops of updating
- The distribution of a free calendar and timetable for schools with a cover that indicates the seriousness of the situation
- Distribution of brochures and leaflets with useful advice and suggestions for the potential saving of water at the domestic level , including
- Development of brochures and leaflets for raising awareness among farmers in terms of saving irrigation water , incentives to reduce intensive farming, the rational use of fertilizers, protection of farmland and overall rational management of water resources (adequate irrigation practices, reduction of pumping, construction of drainage works).
- Develop recommendation on giving focuses not only on the use of all surface water sources that are available, but also on the use of alternative water sources such as recycled for crop irrigation in agriculture, and the recharge of groundwater aquifers.
- Prepare system of informing water users and the public about the current conditions of water balance and the necessity of the various measures that are enforced each time

Project is proposed to be implemented in the Central Kura Basin District during 2016-2021

MENR can involve to the project. Water Resources State Agency, Amelioration JSC, MoH, Azersu JSC, Local authorities and basin organizations in the basin districts and others

Restoration of the continuity of the water flow

The main measures will be:

- Measures of provision of normal functioning and construction of new fish breeders
- Measures to improve the ecological condition of the river beds
- Measures for greening and planting trees near rivers and lake
- Measures on river bank protection
- Environmental flow requirements

The project is planned to be implemented in the Central Kura Basin District during 2017-2018

MENR can involve to the project Water Resources State Agency, Amelioration JSC, MoH, Azersu JSC, Local authorities and others

Use of treated waste water

Main activities are:

- Develop proposal on state of treatment of waste waters currently in newly rehabilitated (under rehabilitation) waste water treatment plants of rayon centers in the basin
- If necessary propose different new treatment options, such as use of reverse osmosis units and other methods. The process of reverse osmosis produces water without limitations on usage, allowing integrated management of every source of irrigation water.
- Conduct soil study to determine the required limits for the application of recycled water for irrigation,
- Develop recommendations on use of recycled water as a resource r for irrigation or other purposes
- To identify ways needed to work towards increasing the acceptance of using recycled water.

Project is planned to be implemented in the Central Kura River Basin District during 2019-2020

MENR can involve to the project Water Resources State Agency, Amelioration JSC, MoH, Azersu JSC, Local authorities and basin organizations in basin districts and others

Educational measures

Main activities are:

To develop recommendations on possible educational measures aimed at creating water awareness in schools and the wider public and among users,, including:

- Further strengthening of the measures on water awareness in Primary Education
- Creation of a Web site promoting water consciousness
- Educational programs for farmers
- Regular meetings of basin organizations with mayors and community councils in small groups
- Information and awareness guide in relation to pollution issues derived from activities in the primary sector 6. Educational programs for the public

- Training and specialization of the personnel responsible for monitoring of ground water and data management
- Campaign raising awareness on the management of rainwater

Project is proposed to be implemented in the Central Kura Basin District during 2016-2021

MENR can involve to the project Water Resources State Agency, Amelioration JSC, MoH, Azersu JSC, Local authorities and others

Monitoring and classification systems

Main activities are:

- Determining of reference conditions for classification of WBs.
- Development of Monitoring program and an Assessment of Qualitative Data System (Annex V of the WFD)
- Develop the ecological status assessment sytem of RWBs based on the monitoringof biological parameters(- macroinvertebrates and phytobenthos and etc)
- To initiate the processes of development of valuation systems for the following biological quality and hydromorphological quality elements:
    - Hydromorphological parameters
    - Macrophytes
    - Benthic invertebrates in rivers with non-continuous flow
    - Fishfauna
- For a safe assessment of the status of all water bodies develop proposal on upgrading of existing monitoring network of WBs in pilot area
- Setting of WFD compliant water quality standards and classification system

Project is planned to be implemented in the Central Kura Basin District during 2016-2021

MENR can involve to the project Water Resources State Agency, Amelioration JSC, MoH, Azersu JSC, Local authorities and basin organizations in basin districts and others

EPIRB pilot projects

By support of EPIRB already two pilot projects are implemented in Central Kura Basin District on support of adoption of EU f WFD, UWWTD at national and pilot basin level and application of IWRM in pilot area and four more planned to be finalized in 2016 pilot projects on support of development of National Water Strategy, application of EU Flood Directive, refurbishment of laboratory and ground water monitoring network in Central Kura BD will also help beneficiaries to adopt their legal and institutional basis to international legislation and develop capacity of their regional divisions according to international practices.

Public Participation

During the development of the RBMP the following public information and consultation measures were taken:

- Information was circulated on the draft and final Communication Strategy and Plan on the website of the project;
- Stakeholder consultation meeting was held on the significant water management issues document ("Pressures and Impact Analysis"), document published for comments in May 2014 at: (www.blacksea-riverbasins.net) ;
- Project newsletter "In the Flow" (6) and brochure on Significant Water Management Issues in Central Kura Basin District have been published and distributed among stakeholders as well as placed on the EPIRB project website www.blacksea-riverbasins.net/;
- The draft Central Kura Basin District RBMP entered the public consultation phase from April 24 2015 until August 31 2015, including a public consultation meeting and possibilities for submitting comments.

The opportunity to participate in the consultations was promoted by: direct notification mass-emails; relevant NGO networks; news items on the EPIRB project website -www.blacksea-riverbasins.net ; the regularly published project newsletter "In the Flow", and targeted media announcements (e.g. www.ganjanews.az, local newspaper etc.).

The stakeholder consultation meeting on the significant water management issues was held in Baku on 2 September 2014. It targeted water practitioners, different key stakeholders from different sectors etc. It had the main aim to present the necessary background information and the preliminary overview of the important water management issues for the river basin, as well as to collect stakeholders' feedbacks concerning the identification of the most important water management issues.

The public consultation meeting "Shaping the future of the Central Kura Basin District" was held in Ganja city on 23 April 2015. It had the main objectives to present the draft RBMP and the planned Programme of Measures, and to discuss and receive feedback, comments and proposals on the draft RBMP, including the planned measures. The meeting gathered 35 participants, representing a broad range of stakeholders such as: relevant state water management organizations, joint stock companies, representatives of water users, municipalities and NGOs. The one day event gave short introduction to the draft RBMP, as well as provided opportunity for feedback and comments through interactive discussion organized within two working groups. The group discussions were guided by independent facilitators, and the outcomes of the discussions were shared in the plenary session by selected rapporteur. The minutes of the meeting can be accessed on the EPIRB project website at: www.blacksea-riverbasins.net.

After the public consultation meeting article was published in local Newspaper in Ganja and summary of discussions of the meeting has been broadcasted by Kapaz TV of Ganja city. Short film was produced about the meeting and distributed in DVD format among stakeholders as well as among students in Baku State University.

Besides the public consultation meeting, opportunity to submit written comments to the draft RBMP was open until 31 August 2015. A total of 5 written comments were received.

All the comments requesting changes to the draft RBMP received during the consultation meeting(s), as well as in written form have been collected and processed by the consultants developing the RBMP in close cooperation with the Ministry of Ecology and Natural Resources of Azerbaijan Republic. In order to ensure transparency a summary report has been prepared which gives an overview on the original comments received and the responses and actions taken, whether it resulted in changes in the draft RBMP etc. The summary report can be found at: www.blacksea-riverbasins.net.

Competent authorities and contact persons

The Ministry of Ecology and Natural Resources of Azerbaijan Republic is main beneficiary organization in Azerbaijan who will approve the developed RBMP. Therefore the ministry is responsible state body on implementation of water resources related policy in Azerbaijan, including development and implementation of RBMP.. By leadership of ministry different related organizations in Azerbaijan and group of experts actively participated in the development of draft of rivers basins managements plan.

In accordance with article 16 of the Water Code of the Republic of Azerbaijan basin approach can be applied in the process of water management of the country. Regional branch of MENR in Gazakh district can take leadership in implementation of Central Kura BD RBMP after it gets approval from government.

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The main sources of information presented in large volume are presented in different annexes to the RBMP including thematic maps, tables and figures.

1. INTRODUCTION AND BACKGROUND

1.1 Brief introduction to the RBMP

Central Kura BD River Basin Management Plan is elaborated according to the methodology of Water Framework Directive/80/.

The Water Framework Directive (Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 is establishing a framework for Community action in the field of water policy, including the protection of surface waters (rivers, lakes, transitional and coastal waters) and ground waters throughout the EU territory/80/. The main environmental objectives of the Directive is to achieve good qualitative and quantitative status of all water bodies (including marine waters up to one nautical mile from shore) and to prevent deterioration and ensure the conservation of high water quality where it still exists.

The ecological and chemical status of surface waters are assessed according to the following criteria:

- Biological quality (fish, benthic invertebrates, aquatic flora)
- Hydromorphological quality such as river bank structure, river continuity or substrate of the river bed
- Physical-chemical quality such as temperature, oxygenation and nutrient conditions
- Chemical quality that refers to environmental quality standards for river basin specific pollutants. These standards specify maximum concentrations for specific water pollutants. If even one such concentration is exceeded, the water body will not be classed as having a "good ecological status"

The core of the pilot Central Kura pilot river basin management plan is to achieve above objectives through implementation of the measures necessary to

- prevent deterioration of the status of waters,
- protect, enhance and restore all bodies of surface waters and ground waters.
- promote sustainable water use (through effective pricing of water services),
- progressively reduce discharges of priority substances and cease or phase discharges of priority hazardous substances for surface waters,
- ensure progressive reduction of pollution of groundwater,
- mitigate the effects of floods and droughts,
- ensure sufficient supply of water,
- protect the marine environment.

The Central Kura river basin management plan according to the WFD begins with an analysis of the characteristics of the river basin district, a review of the impact of human activity on water status, and an economic analysis of water use.

The specific programmes of measures needed to be implemented so as to achieve the objective of good status for all waters within Central Kura BD have been identified in the draft RBMP.

The draft pilot basin River Basin Management Plan will serve as a tool to apply for the first time in Azerbaijan basin approach according to EU WFD requirements.

The gaps in the knowledge needed to elaborate RBMPs in line with the WFD methodology include limited "expertise infrastructure", a fragmented way of analyzing technical issues (where the WFD requires integration), gaps in the knowledge of the human activities impacting water quality and quantity plus a limited number of monitoring stations giving information on the actual water quality and quantity.

In order to make sure that Public Participation in preparation of RBMP is in accordance with WFD requirements will be followed principles of EU WFD CIS Guidance Document No.8 in close cooperation with Regional Environmental Center(REC) in this area .

The public consultation activities will be carried out in accordance with the Communication Strategy and Plan for the Central Kura BD.

1.2 Central Kura Basin District

The Central Kura BD is located in Ganja-Gazakh Economic Region at western part of Azerbaijan and covers Agstafa, Dashkesen, Gadabay, Goranboy, Khanlar, Gazakh, Samukh, Shamkir, Tovuz administrative regions, cities like Ganja and Naftalan. Economic region has suitable economic – geographical location. It is located on the North – eastern slope of Small Caucasus mountainous massive, has border with Armenia in South – West and with Georgia in the West and North of the region (Source: Museyibov M. Physical Geography of Azerbaijan. Baku,1998)

Region covers the area of 12 500 km2 (14.4 % of the territory of the Azerbaijan Republic). The territory of the region can be divided into 4 zones considering its landscape characteristics: sloppy plains, foothill zone, middle highland (1000-2000 m a.s.l.) zone and alpine zone (more than 2000 m a.s.l).

The right tributaries of the Central Kura, starting from the Georgian border before the Mingechavir reservoir, including the four major watersheds of the Agstafachay, Tovuzchay, Shamkirchay and Ganjachay rivers, as well as smaller streams flowing to Kura, were selected as the pilot area for Azerbaijan by the Ministry of Ecology and Natural Resources. These small rivers, along with extensive groundwater wells and aquifers, form major freshwater sources for irrigation use and drinking water supply in the western part of Azerbaijan. In addition, this region is considered as very important, as it has two watersheds - Agstafachay and Tovuzchay are transboundary with Armenia.

Rivers of the region are running from the Lesser Caucasus to the Kura River. Main rivers of the area are: Agstafachay, Tovuzchay, Asrikchay, Zayamchay, Shamkirchay, Ganjachay, Kurekchay, Terterchay which flow into the Kura River directly or into the reservoirs over the Kura River. For the purpose of the RBMP development, the pilot basin was subdivided into 4 main river basins (Ganjachay, Shamkirchay, Tovuzchay and Agstafachay) as it is shown in Figure 1.

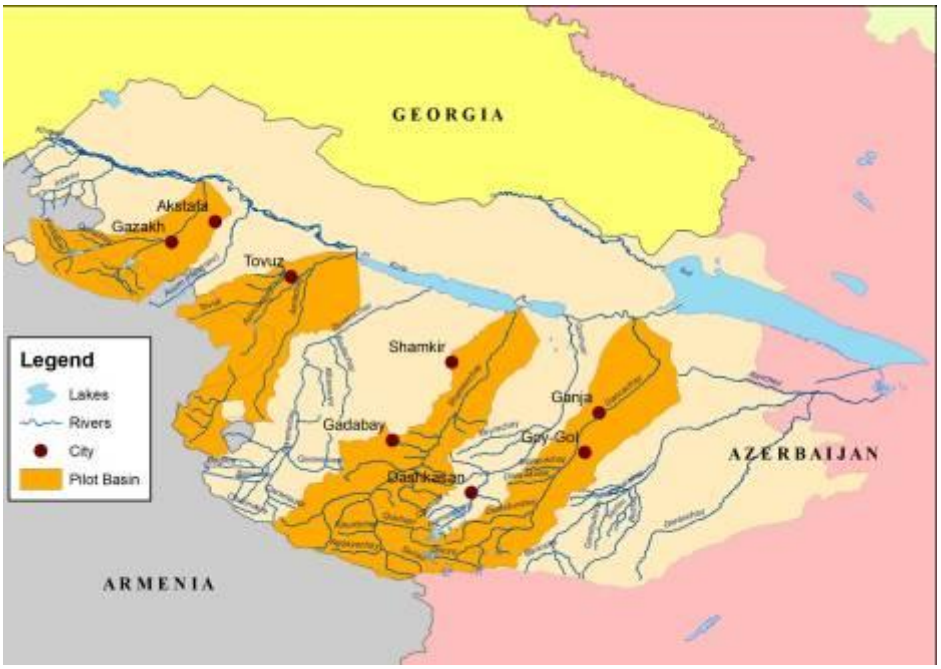


Figure 1.Central Kura BD
(Source: Photo by EPIRB project)

There is no basin organization solely responsible for the management of water resources on a district level. However Gazakh regional office of MENR with support of the Ganja regional branch of the National Hydrometeorology Department (MoE Azerbaijan), with a well covered (although outdated) monitoring network, and pollution monitoring laboratory in Gazakh, may serve as a supplementary institution for the duration of the project.

1.3 Content of draft Central Kura BD RBMP

This River Basin Management Plan (RBMP) for the Central Kura BD is prepared according to the contract made on February 28, 2014 between: Hulla & Co. Human Dynamics KG ("Client") and SADIG LLC ("Contractor"), the leading company of consortium which includes 4 Azeri Companies (SADIG LLC, REC Caucasus/Azerbaijan, SHMI and PERIOD LLC).

The development of the draft River Basin Management Plan for the Central Kura Basin District) as defined by Contract for the needs of the EU project "Environmental Protection of the International River Basins"*(SC № 2011/279-666, Europe Aid/131360/C/SER/Multi).*

The overall goal of the RBMP is to protect surface and ground waters of the Central Kura BD from significant anthropogenic (pollution and hydromorphological) pressures through attaining a number of environmental quality objectives designed to reduce/eliminate significant water management issues in the pilot river basin.

Central Kura BD RBMP contains 11 chapters.

In **Chapter 1** is given introduction to the RBMP, briefly presented the Central Kura BD and content of the RBMP

In **Chapter 2** is given the basic characteristics of the Central Kura BD area, including basin geography, hydrology, climate, demography and etc. Addressed surface and ground water resources and protected areas.

Is given identification and topology of water bodies including natural, artificial and heavily modified water bodies. In **Chapter 3** are described significant pressures and impacts on water bodies and results identification of water bodies at risk.

For all water categories, addressed all pressures, including:

- Point source pollution
- Diffuse source pollution
- Pollution by hazardous/priority substances
- Hydromorphological alterations including all pressure types as listed in the EPIRB Guidance Document

In **Chapter 4** are described protected areas and programs of measures for protected areas.

In **Chapter 5** is described monitoring program and network for surface and ground waters, which include:

- Surveillance, operational, investigative monitoring
- Assessment of water status and confidence levels

In **Chapter 6** are provided environmental objectives and exemptions for water resources and special requirements for the protected areas as below:

- EOs for surface waters (including AWBs and HMWBs)
  - Environmental objectives chemical status
  - Environmental objectives ecological status
  - Results of monitoring and risks assessment
  - EOs and Outline of stepwise achievement
  - List exemptions according to articles 4(4), 4(5), 4(7) – Guidance Doc !
- EOs for groundwater
  - Environmental objectives chemical status
  - Environmental objectives quantitative status
  - Results of monitoring and risks assessment
  - EOs and Outline of stepwise achievement

In **Chapter 7** are described the Programme of Measures to achieve the environmental objectives. For different WBs at risk and possibly at risk to achieve the environmental objectives have been identified:

- Basic Programs of Measures
- Supplementary Programs of Measures

In **Chapter 8 are given** cost estimates, an effectiveness analysis of program of measures. Based on economic efficiency and other indicators measures have been prioritized in this chapter.

In **Chapter 9** of the RBMP are identified main public and stakeholders at national and basin level who should be informed about RBMP and described requirements for presenting the draft RBMP to them.

The main sources of information presented in large volume are presented in different annexes to the RBMP including thematic maps, tables and figures.

Chapter 10 describes competent authorities, **Chapter 11** contact persons in relation to the RBMP and **Chapter 12** public participation in RBMP.

2. THE CENTRAL KURA BD CHARACTERISATION

2.1. Natural conditions

Geographic overview and hydrology

The Central Kura RBD is located near the railway and highways connecting Azerbaijan with Georgia and Black Sea shores. They are connecting Ganja, Gazakh and Agstafa cities which are basic transport junctions. The airport of Republican importance is located in the Ganja city. Pipeline for transportation of oil and gas from the Caspian Sea to the world markets passes through the territory of the region as well.

Rivers of the region are running from Lesser Caucasus to the Kura River. Main rivers of the area are: Agstafachay, Tovuzchay, Asrikchay, Zayamchay, Shamkirchay, Ganjachay, Kurakchay, Tartarchay flowing into the Kura River directly or into the reservoirs on the Kura River(Shamkir, Enikend, Mingechavir).

Ganja-Gazakh region has a dry, warm climate in the plains, temperate – warm and steppe – dry winter climate type in lowland. In the mountain area climate is cold and humid. Average annual temperature is 11.8 – 13.0 ^{0}C. Average annual precipitation ranges between 250 – 500 mm.

Average temperature in July is 23-26 ^{0} C, absolute maximums are 37 – 40 ^{0}C. The winter temperate is warm. The average temperature in January is 0 ^{0}C. Absolute minimums makes up 6 – 10 ^{0}C frost. Duration of period without frost is 220 – 250 days. There isn't long snow cover period. Amount of annual precipitation in plains is 240 – 390 mm. İn high mountains precipitation changes between 500-850 mm/36/.

Vegetation in Gazakh-Agstafa part of the region consists of riparian forests on the right bank of the Kura River and winter pastures of Jayranchol grassland. Alluvial grasslands along the Kura River are characterized by tamarisk forests besides riparian forests rich with willow, white poplar, alder – tree and various shrubs. Mountain xerophyte, wormwood steppes in highlands, wormwood rich dry steppes in foothills and wormwood semi – deserts dominate in the region.

Because of poor protection of forestry, density of highly productive soil – protecting and water – purifying forests have been decreased, even disappeared in some places as a result of illegal cutting of trees and improper animal grazing in forests during the year. As popular forests have suitable conditions for natural self-restoration lots of sprouts and shoots grow there. But shoots perish as a result of cattle grazing in forests, and this impedes natural self-restoration of forests.

2.2. Delineation of surface water bodies

Introduction

Identification, delineation and typology of the water bodies in the Central Kura BD was implemented based on the River Basin Analysis, which is a first step of the River Basin Management Plan (RBMP). To achieve the objectives, were carried out identification of surface water bodies in the Central Kura BD, determination of the typology of identified surface water bodies, delineation and mapping of surface water bodies, including natural water bodies,, artificial water bodies (AWB) and heavily modified water bodies (HMWB)..

The technical implementation of the above-described activities was based on practical application of elements of the WFD and CIS documents, particularly the EU Water Framework Directive (2000/60/EC) Common Implementation Strategy, Guidance Document no 2, "Identification of Water Bodies", European

ommunities, 2003;" and EU Water Framework Directive (2000/60/EC) Common Implementation Strategy, Guidance Document no 4, "Identification and Designation of Heavily Modified and Artificial Water Bodies", European Communities, 2003;.

2.2.1 Summary of the methodology for identifying surface water bodies

Under the term surface waters we considered all inland water objects, including rivers, canals, lakes, reservoirs and ponds.

For the purposeto assess the ecological status of surface waters and for planning and implementing program of measures, rivers and lakes were been divided into discrete volumes, or bodies of surface water (WBs). According to the Water Framework Directive (WFD) the "water body" should be a coherent sub-unit in the river basin to which the environmental objectives of the directive must apply.

The process of delineation and identifying surface water bodies consisted of division of water bodies into sections and parts according to agreed parameters and criteria.

Each surface water body is subject to regular assessment of status and measures for improving and maintaining the status of water bodies.

The method used for the WBs delineation involves identification of the location and boundaries of surface water bodies and initial characterization in accordance with the methodology described below.

- The surface WBs within the river basin /sub-basin were identified as falling within either one of the following surface water categories —rivers, lakes, or as heavily modified surface water bodies.
- For each surface water category, the relevant surface WB within the river basin/sub-basin was differentiated according to a type. These types are defined using the system A of the WFD in accordance with the ToR of EPIRB Project (Tab. 1).
- Each surface WB within the river basin/sub-basin should be differentiated by the relevant ecoregions in accordance with the geographical areas. The pilot basin under this review belongs to the 24-th ecoregion (the Caucasus).
- Afterwards the WBs were differentiated by surface water body types according to the descriptors set out in the table 1.
- For heavily modified surface water bodies the differentiation was undertaken in accordance with the descriptors for whichever of the surface water categories (rivers or lakes) most closely resembles.

Table 1.System A: Rivers and Lakes

Fixed typology	RIVERS Descriptors	LAKES Descriptors
Ecoregion	24 (Caucasus)	24 (Caucasus)
Type	Altitude typology • *high: >800 m* • *mid-altitude: 200 to 800 m*	Altitude typology • *high: >800 m* • *mid-altitude: 200 to 800 m*

	• *lowland: <200 m*	• *lowland: <200 m*
	Size typology based on catchment area • *small: 10 to 100 km²* • *medium: >100 to 1 000 km²* • *large: >1 000 to 10 000 km²* • *very large: >10 000 km²*	Size typology based on surface area • *0.5 to 1 km²* • *1 to 10 km²* • *10 to 100 km²* • *>100 km²*
		Depth typology based on mean depth • *<3 m* • *3 to 15 m* • *>15 m*
	Geology • *Calcareous* • *Siliceous* • *organic*	Geology • *Calcareous* • *siliceous* • *organic*

All rivers with a river basin over 50 km^2 and lakes (reservoirs) with a surface area over 0.5 km^2 were considered for the purpose of establishing and identifying surface water bodies. Rivers with the catchment areas smaller than 50 km^2 were categorized into individual water bodies in respect to their significance. However, all small rivers are included into larger drainage basins, which serve as the basis for the management of water bodies.

Establishment of surface water bodies was based on types of water bodies in natural conditions. The type of the water body in natural conditions was identified for each surface water body.

2.2.2. Identification and delineation of Surface Water Bodies

Surface water bodies are classified into water bodies in natural conditions, heavily modified and artificial water bodies. Determination of surface water bodies and heavily modified water bodies is based on several guidelines and an agreed methodology, is described below.

53 surface water bodies have been identified on the rivers of the Central Kura BD. Five water bodies (irrigation canals) have been identified as the artificial water body. Three lake water bodies are located on the territory of the pilot basin. Two of them (reservoirs) have been identified as the heavily modified water body. The results of WBs delineation are provided in Table 2, 3.

Table 2. Number and total length of river water bodies of the Central Kura BD

Water bodies in natural conditions		**Artificial water bodies**		**Heavily modified water bodies**	
Number	**Length, km**	**Number**	**Length, km**	**Number**	**Length, km**

48	915.6	5	107.68	1	11.0

Table 3. Number and total area of lake water bodies in the Central Kura BD

Natural lakes		Artificial water bodies		Heavily modified water bodies	
Number	**Area, km^2**	**Number**	**Area, km^2**	**Number**	**Area, km^2**
1	0.6	-	-	2	8.55

A list of all surface water bodies is provided in Annex 5 and they are shown on the map in Figure 2.

2.2.3. Summary of delineated surface water bodies typology

The type of a water body depends on the set of natural properties of the water body or their parts.

Identification of the types of rivers is based mainly on geographical and morphological character.

On the basis of the ecoregion and Geology all rivers in the Central Kura BD belong to one single type, meanwhile by the Altitude factor and the Catchment size rivers fall within 7 groups:

- Type I includes 1 water body with the small catchment area less than 100 km^2 on the altitude from 200 to 800 m;

- Type II includes 10 water bodies with the small catchment area less than 100 km^2 on the altitude above 800 m;

- Type III includes 2 water bodies with the medium catchment area from 100 to 1000 km^2 on the altitude below 200 m;

- Type IV includes 14 water bodies with the medium catchment area from 100 to 1000 km^2 on the altitude from 200 to 800 m;

- Type V includes 14 water bodies with the siliceous ormation and the medium catchment area from 100 to 1000 km^2 on the altitude above 800 m;

- Type VI includes 1 water body with the large catchment area 1000 to 10 000 km^2 on the altitude below 200 m;

- Type VII includes 11 water bodies with the large catchment area 1000 to 10 000 km^2 on the altitude 200 to 800 m.

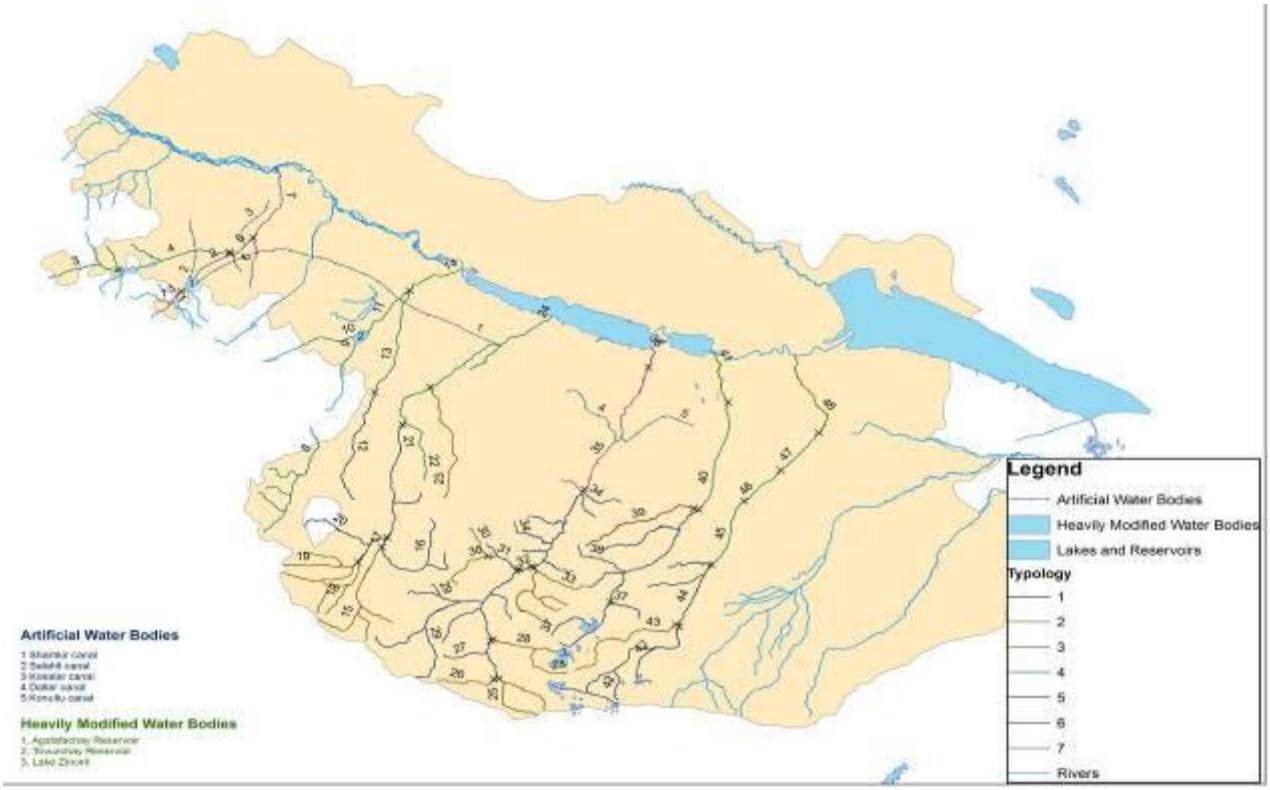


Figure 2. Delineated Surface water bodies in Central Kura BD

As pilot studies included only area located in Ganja-Gazakh region, therefore in the RBMP delineation and other studies have been conducted for rivers located between Ganjachay and Agstafachay. In the future delineation and other studies related to WBs of Kurakchay basin can be added and included into plan.

The WB types within the Central Kura BD and the corresponding characterizing factors are provided in Tables 4 below.

Table 4. Typology of rivers in the Central Kura BD

Descriptor	**Type**						
	I	**II**	**III**	**IV**	**V**	**VI**	**VII**
Ecoregion	24						
Geology	Siliceous						
Size typology based on catchment area	small:10 to 100 km2		medium: >100 to 1 000 km^2			large:>1 000 to 10 000 km^2	
Altitude	200-800	>800	<200	200-800	>800	<200	200-800

Typology for 3 lake water bodies is also based on geographical and morphological characteristics. On the basis of the ecoregion and geology factors, all lake water bodies in Central Kura BD belong to one single type, meanwhile by the surface area size, altitude and the depth lakes fall into the following two groups:

- Type I includes 1 water body with the surface area from 0.5 to 1 km^2 and the average depth from 10 to 15 m on the altitude above 800 m.
- Type II includes 2 water bodies (reservoirs) with the surface area from 1 to 10 km^2 and the average depth over 15 m on the altitude from 200 to 800 m.

Table 5. Typology of lake water bodies in the Central Kura pilot basin

Descriptor	Type	
	I	II
Ecoregion	24	
Geology	Siliceous	
Size typology based on surface area	0,5 to 1 km2	1 to 10 km^2
Altitude	>800	200-800
Depth	10-15 m	>15 m

2.2.4. Identification of Heavily Modified Surface Water Bodies

In accordance with the EU WFD, the HMWB is designated as "a body of surface water which as a result of physical alterations by human activity is substantially changed in character" (CIS, Guidance Document #4).

İn the early stages of the project the HMWBs were preliminarily designated. This HMWB designation process aims to justify why the WB should be classified as HMWB and therefore should have less stringent objectives in terms of ecological status improvements.

Three water bodies (2 lakes WBs and 1 river WB) have been identified as heavily modified surface water bodies in the Central Kura BD:

- The Agstafachay Reservoir, 10-1-HMWB01, with a surface area 6,3 km2 was identified as HMWB due to significant hydromorphological changes by dam construction on the Agstafachay River. The dam of 53 m height was constructed in 1969. The water capacity of the Agstafachay Reservoir is 0,12 km3. The reservoir is used for irrigation and flood protection.
- The Tovuzchay Reservoir, 11-1-HMWB02, with a surface area 2,25 km2 was identified as HMWB due to significant hydromorphological changes by dam construction on theTovuzchay river. The dam of 16.4 m height, the construction of which started in 1980 and finished in 2012. The water capacity of the Tovuzchay Reservoir is 0,037 km3. The reservoir is used for irrigation.
- The Ganjachay River reach near Ganja city, 11 km long, was identified as HMWB. The Ganjachay River is channeled, and the banks of the river are reinforced by concrete dams of 4 meters height. These permanent and significant alterations of river morphology should lead the changes in the river ecosystem.

Following the initial establishment of heavily modified surface water bodies, the final establishment will be conducted after analyzing the gaps based on JFS materials and also on results of the risk assessment for the surface water bodies. The final establishment will consist of verification of the validity of the criteria used to qualify a water body as a heavily modified surface water body. Map of HMWBs is also given above

(Figure 2)

2.2.5. Identification of Artificial Surface Water Bodies

The length of the canals in the Azerbaijan Republic is 47.058 km, and 1.4 million hectares of irrigated area.

The main irrigation canal of the pilot basin is the Agstafachay canal from the Agstafachay Reservoir that is served the irrigation tract Ganja-Qazakh from 1969. The right bank of this canal is named as Shamkir canal (10-1-AWB01). This canal is 58 km long, and has the water discharge capacity about 27 m3/sec. Shamkir canal is served 24,000 ha of the irrigation area. The left bank of Agstafachay canal is named as Salahli canal (10-2-AWB02). It is 11 km long, and has the water discharge capacity about 12 m3/sec and the irrigation area of 12,000 ha. The Kosalar canal (10-3-AWB03) of 10.5 km long was constructed in 1955. The irrigation is area 272 ha, the water discharge capacity – 0.35 m3/sec. These 3 canals were identified as artificial water bodies in Agstafachay River Basin.

The Dallar and Konullu canals start from the Shamkirchay River. The Dallar canal (21-1-AWB04) is 14.5 km long. It has been constructed in 1928. The Dallar canal is served 439 ha of the irrigation area, and has the water discharge capacity about 0.8 m3/sec. The Konullu canal (21-2-AWB05) of 14.8 km long has been constructed in 1916. The canal irrigated area is 956 ha, the water discharge capacity - 2.5m3/sec.

Five water bodies identified as AWBs are on the Figure 3.

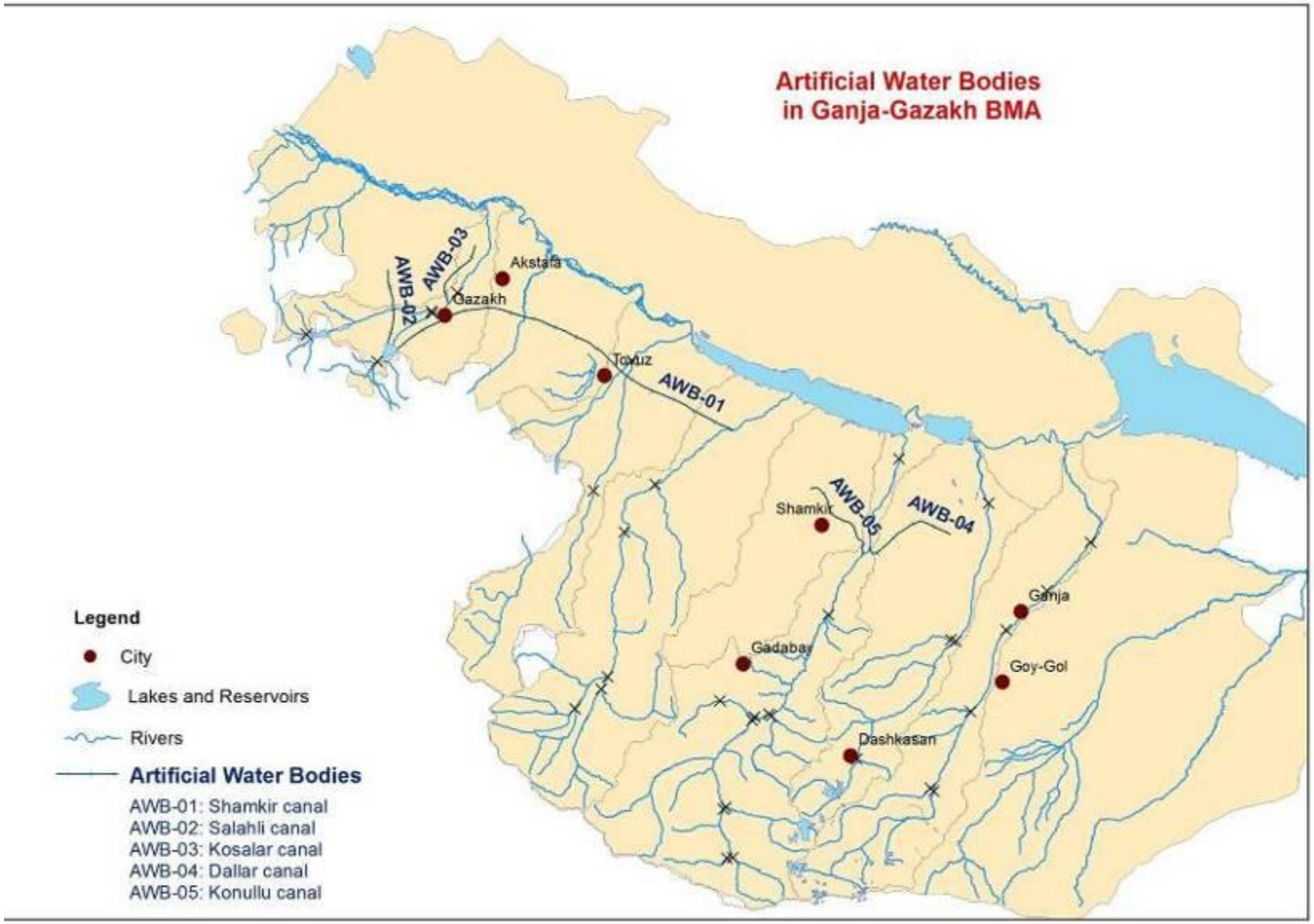


Figure 3 . Artificial Surface Water Bodies

2.3. Preliminary delineated groundwater bodies

Rechargable capacity of fresh and weak salty ground waters of foothills of Central Kura BD by the information of Hydrogeological and Engineering Geological Expedition of the National Geological Exploration Service under the Ministry of Ecology and Natural Resources of Azerbaijan Republic make up 4.2 mln.m^3/day ,of which 842,6. mln.m^3/day is used currently (91.3 mln.m^3/day is used for drinking and communal use purposes and 751,3 mln.m^3/day for irrigation

The EU Water Framework Directive (further WFD) requires identifying "groundwater bodies" as part of analysis of river basin districts. "Groundwater body" is the management unit that is necessary for the subdivision of large aquifers into smaller sub-units. Such division will facilitate groundwater management. Groundwater conditions may vary from one aquifer to another or even within the aquifers, as well as the anthropogenic activities that could impose pressures on the qualitative and quantitative status of ground waters. By distinguishing smaller sub-units, targeted management plans can be developed and adjusted to the specific conditions of the groundwater unit. On the other hand, it is important to end up with a manageable number of water bodies. Too extensive sub-division of water bodies should be avoided in order to reduce the administrative burden of management and groundwater monitoring cost.

The approach for delineation of groundwater bodies in the pilot Central Kura BD was based on the EU Water Framework Directive and its guidelines(EU Water Framework Directive (2000/60/EC) Common Implementation Strategy, Guidance Document no 2, "Identification of Water Bodies", European Communities, 2003;.

A conceptual model of the pilot area has been developed as a result of consultations. It has been found out that general geological composition of the pilot Gazakh Ganja region is like this:

1. In high mountainous area groundwater is contained in Cretaceous limestones, sandstones, argillaceous slates, sandstone and volcanic –tuff rocks.
2. In lower mountain area aquifers are located in Jurassic porphyrites and their tuffs, tuffo-conglomerates and tuffo sands.
3. In foothill and river valley area groundwater is mainly related to Quaternary sedimentary and volcanic sedimentary rocks of different lithological composition: basalts, boulders, pebbles, sands, gravel, sandy loams, clays. Flat areas in Gazakh – Ganja region are mainly composed of alluvial – prolluvial sediments.

Hard copy of hydrogeological map was an important source of information and has been used as a basis for delineation. Later this map has been digitized and is included into report (see figure 4). Information from the "River basin analysis" report was also a used for characterization of hydrogeological units (aquifers).

The following recommendations of the WFD have been considered when delineating groundwater bodies in Central Kura BD:

- Different aquifer types (porous, sedimentary, volcanic, etc.) have been distinguished from the hydrogeological map;
- Geological boundaries of the aquifers defined;
- Hydrodynamic differences of the aquifers analyzed;
- Hydro chemical varieties of the aquifers evaluated;
- Groundwater abstraction (>10 m3/d) has been checked and defined;

- Groundwater system which consisted of several layers of shallow aquifers with similar hydrodynamic and hydroc hemical conditions have been considered as one water body;
- Hydrogeological units with the same chemical and same quantitative status have been assigned as groundwater bodies;
- The lower boundary of GWB was determined by the depth of occurrence of fresh aquifers which are used for domestic, agricultural or industrial water supply and from which there is still realistic to pump water for production (not disproportionately expensive);
- Fragmentation of aquifers into unmanageable numbers of water bodies has been considered and small groundwater bodies with similar characteristics were grouped;
- Groundwater bodies were given temporary codes: G102, G201, etc., where G-stands for "groundwater" and 101, 201, etc. are numbers of the bodies;
- All preliminary identified groundwater bodies have been assigned to Central Kura BD

The following main hydro geological units (aquifers) in the Central Kura BD have been analyzed for groundwater body delineation:

1. Upper-Middle Quaternary aquifers (geological index Q_{UOI-IV}), composed of pebbles, gravel, sand with interlayer's of clay and loam;
2. Lower Quaternary-Upper Pliocene aquifers (geological index Q_{II}^{3}-Q_{I}) contained in gravels sands, clays and loams;
3. Elluvial-delluvial-prolluvial aquifers (geological index $edpQ_{IV}$), composed of gravels sands, clays and loams with debris material;
4. Alluvial aquifers (geological index aQ_{IV}) contained in gravels filled with sand and river stones;
5. Neocene aquifers (geological index N_1+N_2) are located in conglomerates, sandstones, sand, graves, clay and limestone;
6. Upper –Lower Cretaceous (geological index K_1-K_2) aquifers with water bearing sandstones, limestones, tuffs, tuff- breccias, porphyrites tuffogravelites, aleurolites, conglomerates, marls, etc.
7. Upper-Middle Jurassic aquifers (geological index J_{2-3}, K_2) composed of volcanic porphyrites their tuffs, tuff- sandstones, quartz porphyrites and their tuffs. The thickness of Jurassic sediment is 1500-2000 m.
8. Locally water bearing intrusive rocks (geological index Y) containing small volumes of water in fractured granites, grano-diorites and diorites.

The above mentioned aquifers have been analyzed, their hydrochemical and hydrodynamic characteristics compared and some smaller aquifers were grouped, for the purposes of avoiding fragmentation. Based on all these features groundwater bodies have been identified and mapped. Before the delineation of groundwater bodies aquifers have been initially characterized and groundwater in them preliminary classified.

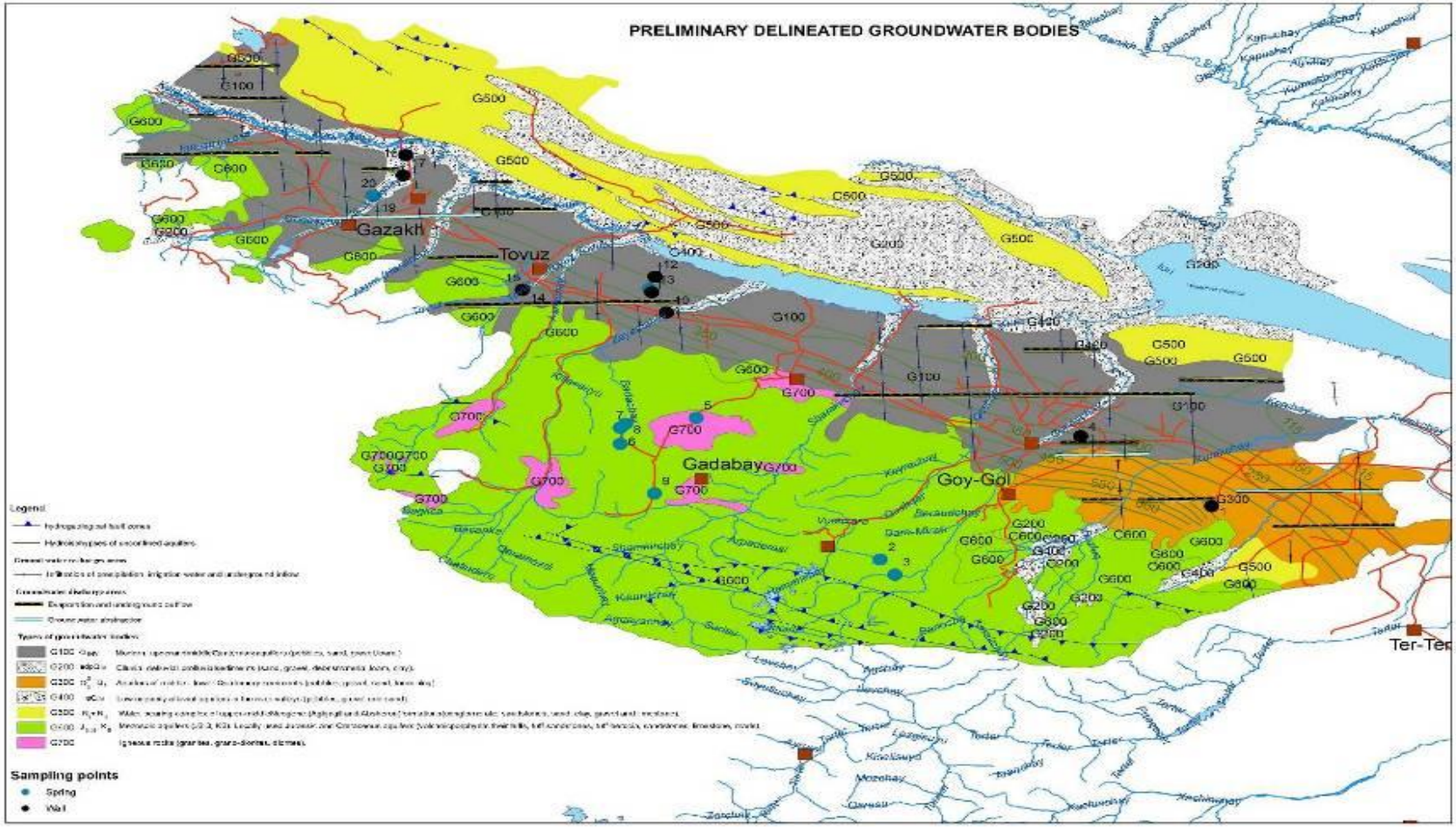
Totally 7 groundwater bodies (G-100 - G-700) have been preliminary identified and delineated in Central Kura BD(figure 4). Four groundwater bodies have been identified in the Quaternary aquifers, of them one is unconfined and three confined (artesian) and three groundwater bodies delineated in Pre-Quaternary aquifers .

All groundwater bodies of the Central Kura BD are of good chemical and quantitative status and are used for water supply to a various extent.

Table 6. Preliminary identified GWB in Central Kura BD

Name of the GWB	Water bearing sediments	No. of identified GWB	Temporary codes of GWB
Upper-Middle Quaternary GWB	Pebbles, gravel sand with interlayers of clay and loam	1	G-Q100
Elluvial-delluvial-prolluvial GWB	Gravel, sand, clay, loam and debris material	1	G-Q200
Lower Quaternary-Upper Pliocene GWB	Differently grained sands with gravel and pebbles, lenses and interlayers of sandy and clayey loam	1	G-300
Alluvial Holocene GWB in river valleys	Pebbles, gravel sand with interlayers of sandy and clayey loam	1	G-400
Neocene (Absheron and Agchagil) GWB	Conglomerates, sandstones, sand, gravel, caly, limestone	1	G-500
Mesozoic (Jurassic-Cretaceous) GWB	Porphyrites and their tuffs, tuff-sandstones, tuffo-breccias, sandstones, limestone, marls	1	G-600
Intrusive GWB	Granites, grano-diorites, diorites	1	G-700
	Total:	7	

Figure 4. Preliminary delineated groundwater bodies



(Source :EU "Environmental Protection of International River Basins" Project, "Identification, Characterization and Delineation of Groundwater Bodies in the Caucasus Countries ", Report by Bernardas Paukstys, 2014);

3. SIGNIFICANT PRESSURES AND POSSIBLE IMPACTS ON WATER STATUS

3.1. Methodology and information sources

Development of River Basin Management Plans (RBMPs) according to the EU Water Framework Directive (2000/60/EC) requires implementation of subsequent steps that build upon each other. The ***Pressure and Impact Analysis*** according to the EU WFD's Article 5 and the corresponding Annex II is an essential component. It forms the basis for designing monitoring programmes in specific the operational monitoring programme that responds to identified water bodies "at risk". More specifically, the *Pressure and Impact Analysis* supports the setting of tailor made and effective programme of measures to achieve the required EU WFD environmental objectives.

The main objective is to identify ***significant pressures and impacts on water bodies of the Central Kura BD***.

It should be noted that Pressure and Impact assessment is not used widely in Azerbaijan. Only within the donor supported projects (EU financed EPIRB, Kura TACIS) such assessments was carried out in different pilot river basins.

Therefore, in this report the approach from the CIS IMPRESS Guidance Document #3[1] was used and also the EPIRB Project Guidance Document Addressing Hydromorphology and Physico-Chemistry for A Pressure-Impact Analysis/Risk Assessment According to The EU WFD (pressure indicators and parameters).

The Pressure and Impact analysis has focused on the significant pressures and related impacts which have been identified in the previous studies. These are as follows:

- hydromorphological alterations due to water abstractions, river continuity, river channel changes (sand and gravel extraction);
- water pollution from point and non-point (diffuse) sources.

All available data sets of the general physic–chemical parameters and hydromorphological parameters and characteristics were used during the pressure and impact analysis of the water bodies in the Central Kura pilot river basin. More specifically, following analyses results and information sources were used: i) River Basin Analysis in the Central Kura BD, Azerbaijan; ii) Water Body Identification and Typology; iii) Identification, Characterization and Delineation Of Groundwater Bodies in the Caucasus Countries; iv) Classification of Groundwater Bodies; iv) Joint Field Survey I and Joint Field Survey II data. Furthermore, data from the national water quality monitoring for the last years and official statistical data related to water management issues were used as well (see chapters below).

[1]https://circabc.europa.eu/sd/a/7e01a7e0-9ccb-4f3d-8cec-aeef1335c2f7/Guidance%20No%203%20-%20pressures%20and%20impacts%20-%20IMPRESS%20(WG%202.1).pdf

However, during the Pressure and Impact Analysis Report development it was found that there is lack of data and information related mainly to the point and diffuse sources of pollution and also as disadvantage it recognized that only aggregated statistical data for the administrative units of the Central Kura BD are available. In this situation the formulas to calculate the pressure indicators and expert judgments were applied.

3.2.Human activities

3.2.1. Population and economic activities

As of January 1 2014, number of population in the Ganja-Gazakh Economic region amounted 1,240,418 (which means by 13,078 or 1,1% percent more comparing with the relevant period of last year). Population of the economic region makes 13,6% of the total country inhabitants. Average density of the population is 100 inhabitants/km^2. 46,5% of the population lives in urban and 53,5% lives in rural areas. 50,5% out of total population are women and 49,5% men respectively/(Source: Azerbaijan State Statistical Committee, 2014)

Most dense settled part of the region is Ganja city and Naftalan city. Except Ganja and Naftalan cities, Dashkesen rayon is leading for the percentage of urban population (43,2%) and Gadabay rayon is the leader for rural population (88,9%).

The main sectors of economy are agriculture, food processing and light industry and handicraft. The region is rich of such natural minerals as iron ore, copper, gold, silver, aluminum, limestone, marble, gypsum, collide, cement, etc. Especially iron ore and gold resources in Dashkesen, aluminum minerals in Zeylik, limestone in Khoshbulag and gold, silver and copper in Gadabay are of economic importance. The part of the Kura River flowing through the region has abundant hydro energy recourses. The economic region also has natural-recreational recourses.

As of January 1, 2014, the number of population in the age of labor capability was 797 300 or 64.2 % of total population(Source: Azerbaijan State Statistical Committee, 2014)

. Only 639 249 inhabitants out of this figure are working. Number of men in age of labor capability is 392 800 and this figure is 404 500 for women. Average nominal monthly salary in the region is 261.4 manat/79/.

The overall volume of general production in Ganja-Gazakh economic region was 2765.3 million AZN in 2013. The growth of overall production is primarily due to agriculture, construction and commerce sectors. In Figure 5 is given the general production volume per sectors in the economic region, million. AZN(Source: Azerbaijan State Statistical Committee, 2014)

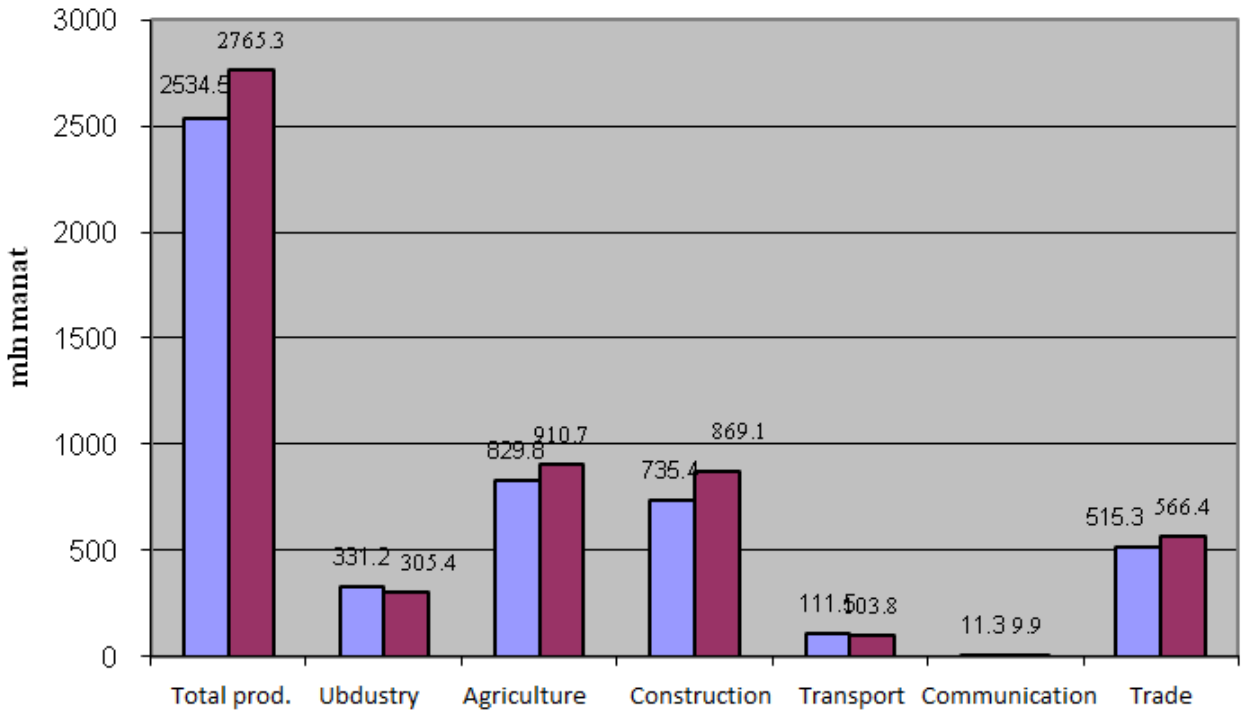


Figure 5. General production volume per sectors in the economic region, million AZN

(Source: Azerbaijan State Statistical Committee, 2014)

Socio- Economic situation by January 2014 in different rayons of the region is described in Annex 2.

3.2.2.Industry and mining

Mining

The main mineral resources of the area are sulfuric pyrites, cobalt, barite, iron ore, alunit, stone marble, gypsum, zeolite, bentonite, crude cement, gold, copper, limestone. This is the second industrial region in the Republic. The region is sharing 12 – 13 % of industrial production in Azerbaijan.

One of the significant metal mining industrial regions (Dashkesen rayon) of the country is located near the Qoshgarchay basin. The region is rich in natural resources such as iron ore, cobalt, alunite, marble, limestone and so on. Currently there were confirmed 3 iron ore fields within the country: "Dashkesen", "South Dashkesen", "Demir" fields.

Discovered iron ore resources' volume is more than 250 million tons.

After economic crisis "Dashkesen filizsaflashdirma" JSC which was established in 2007, began production of iron ore only in August of 2010. To date, the volume of sold iron ore concentrate by the plant is 60 thousand tons. The volume of iron in the 36 thousand tons of total extracted concentrate is 60.3%, while in the remaining part is 52-58%. The mining capacity of the plant is 40-50 thousand tons of iron ore per month.

It is planned to increase the annual production capacity of "Dashkesen filizsaflashdirma" JSC up to 500 thousand and then up to 1 million tons, after Steel workshop of the newly constructed Aluminum plant will be operated.

Zaylik "Alunite" production field have begun production in 1967. The field's production capacity was planned to be 1 million tons of crushed alunite ore annually. The last time the field was partly operated in 1997. On the basis of Zaylik alunite ore was established Ganja Aluminum Plant producing aluminum oxide from the alunite. Considering the raw material basis of "Dashkesen filizsaflashdirma" JSC and Zaylik "Alunite" production field, in 2008 there was founded aluminum and steel complex of two largest industrial enterprises in Ganja.

Figure 6. Transportation of ore in Dashkesen iron ore deposit

(Photo by: EPIRB project, 2012)

The Gedabey area is rich with the underground resources such as gold, uranium, copper, and colored minerals. The gold deposit in Soyutla was open by brothers Siemens. At present in the area the plant on production of gold on which about 2000 thousand people work is open. The enterprises of nonferrous and ferrous metallurgy are active in Ganja and Dashkesan.

Dashkesen marble quarry began operating in 1966 under the Chiragidzor mine (under the "Rizvan" Ltd since 1985) of Goygol rayon. The production capacity of the quarry is 3000 m³ annually. Marble quarry "Rizvan" Ltd produced 1120 tons of marble blocks, 1237 tons of marble pieces, 131 tons of marble plaques within 6 months of [http://www.mie.gov.az] .

The machinery industry includes device production, communication supply, vehicle repairing and production of agricultural devices.

Power industry: Ganja, Shamkir and Enikend hydroelectric power stations are active. Plants of the chemical industry are operating in Ganja city produces sulfuric acid, potash fertilizers. The light industry of the area is based on processing of local raw materials (cotton combine in Dalimamedli, the enterprises of cotton and wool and carpet production in Ganja, Gazakh, Dashkesan).

On the border with Armenia, on "Dashsalakh" field, bentonite production is the major component in metallurgy and foundry production which is now managed jointly by the Russian-Azerbaijani venture "Azrosprominvest". The Azerbaijani bentoniti is distinguished on its quality. There was invested 2,7 million US Dollars to this joint – venture. The capacity of the "Azrosprominvest" is 245 000 tons per year. This company is providing 90 % of bentonite in Russian metallurgy market.

3.2.3. Agriculture

Agriculture plays an important role in social-economic development of the region as more than 50% of the residents of Ganja-Gazakh economic rayon live in villages. Therefore more than 40% of the overall productivity of the region is based on the agriculture.

The economic region has been specialized in the field of viticulture and potato production. As well as wheat, cotton, fruit and tobacco production have been developed. Most of agricultural crops(located in lowland areas) need intensive irrigation..

It must be noted that, in 2012 year, 95,035 ha (48,1%) of 197,525 ha crop yields in the agriculture of Ganja-Gazakh economic rayon belonged to grains and grain legumes areas/76/.

Livestock play one of the important roles in this economic rayon. In 2012 year, the quantity of large horned livestock was 366,1 thousand, sheep and goats was 1835,9 thousand, birds was 2,5 million.

It must be added that, in Ganja-Gazakh economic region there is large capacity for development of viticulture, potato production, vegetable production, dry subtropical fruit production, melon and gourd production, horticulture, grain production, cattle-breeding. In order to use this potential there is need to provide necessary irrigation water.

Production of main livestock products (in all categories of production) in Ganja-Gazakh region have been doubled during last 15 years and makes 28,7 thousands ton meat, 272 thousands ton milk and 3978 thousands ton wool.

It must be mentioned that, the Ministry of Agriculture, the Ministry of Economy and Industry, Amelioration JSC and local Executive Powers will carry our significant activities in the field of the development of the agriculture of Ganja- economic region in 2018 according to the StateProgram("State Program on Social-Economic Development of the regions of the Republic of Azerbaijan in 2014-2018 years").

3.2.4. Water uses

By the information of State Statistic Committee of Azerbaijan Republic total water resources of pilot area are 1.2 -1.4 billion m^3. Water abstraction in the pilot region was about 1131 million m^3 in 2013 of which around 150 million m^3 was lost during transportation and 877,4 million m^3 has been used for different sectorsSource: Azerbaijan State Statistical Committee, 2014).

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Used waters are distributed by raions in 2013 according to table 7 (By the information of State Statistic Committee of Azerbaijan Republic).

Table 7 . Water use by raions of Ganja Gazakh region(Million cub.m)

Ganja-Gazakh economic region-total	Total used water	Water use for irrigation	Drinking water supply	For production

Total	877	**842**	25.8	8.6
Ganja t.d.	22,1	1,6	17,9	2.6
Gazakh region	57,3	54,7	1,3	1.3
Agstafa region	112	73,9	0,4	0.02
Tovuz region	97,7	95,4	1,3	0.01
Shamkir region	173	167	1,2	4.6
Gedabey region	0,2	-	0,2	
Dashkesen region	0,3	-	0,3	
Samukh region	154,9	154,6	0,3	0.01
Goygol region	51,1	49,6	1,5	
Goranboy region	247	245	1,8	
Naftalan t.u.	0,6	0,01	0,6	

(Source:Azerbaijan State Statistics Committee, By information of Azerbaijan Amelioration JSC, 2013)

As one can see from above table share of located in higher elevations Gedabey and Dashkesen regions is very low depending on climatic condition and crop water demand regimes.

Dry climate, non-uniform distribution of limited water resources, population growth and fast development of the economy in recent ten years gradually increase the need for water on the plains of Ganja-Gazakh region. The key aspect of economic activity consists of irrigation farming and water use for domestic needs.

Overall volume of the total water intake from rivers by rayons in the Central Kura BD in 2013 is given in Table 8. Looking on the data it is evident that there are huge losses of water (approximately 40 %) (Source: Regional offices of Amelioration JSC. In Ganja –Gazakh region, 2014).

Table 8. Total water intake from rivers in 2013

№	Rivers	Irrigated area, thousand hectare	Administrative region	Volume of water intake, mln. m^3	Volume of water use for irrigation, mln. m^3	Volume of water losses mln. m^3
1	Agstafachay	26.0	Gazakh, Agstafa, Tovuz and Shamkir	144.6	102.8	41.8
2	Hesensu	2.1	Gazakh	9.6	6.9	2.7
3	Akhincachay	8.7	Gedabey, Tovuz	56.4	35.2	21.1

4	Tovuzchay	2.3	Tovuz	35.0	25.1	10.1
5	Asrikchay	0.8	Tovuz	4.1	2.4	1.7
6	Zeyemchay	9.7	Gedabey, Tovuz	57.2	44.4	12.8
7	Ceyirchay	6.5	Gedabey, Shamkir	51.0	38.5	12.5
8	Shamkirchay	21.1	Gedabey, Shamkir	167.1	106.7	60.4
9	Goshqarchay	5.0	Dashkesen, Goygol, Ganja	20.3	9.7	10.6
10	Ganjachay	18.3	Goygol, GanjSamukh	311	185.3	125.7

(Source: Azerbaijan State Statistical Committee, 2013)

3.2.4.1.Water intake for irrigation

The following table provides the information about the main irrigation channels of the area (Table 9)

Table 9. Information about the main irrigation channels (Ahmadzade, 2003)

	Name of channels	Exploitation year	Water source	Length, km	Water discharge capacity m^3/sec	Served area thous. ha	Located area	Served irrigation areas
Agstagfachay channel								
1	Right bank	1969	Aqstafachay reservoir	58.04	27	24	Gazakh, Agstafa, Tovuz, Shamkir	Ganja-Gazakh
2	Left bank	1969	Aqstafachay reservoir	11.06	12	12	Gazakh, Agstafa	Ganja, Gazakh

The mass construction of water reservoirs in Azerbaijan has started in 50s of last century. Water reservoirs were built mainly for irrigation purposes (Ahmadzade, 2003). In Table 10 information is given about the water reservoirs active in the area and shown on Figure 7.

Table 10. Information about the main water reservoirs (Ahmadzade, 2003)

№	Name of the	Date of Exploitation	Name of the River basin	Total volume	Area of water surface	Height of the	Rayon	Note

	reservoir			mln. m^3	km^2	dam m		
1	Agstafachay	1969	Agstafachay	120	6.38	52.5	Gazakh	
2	Joghazchay	1988	Joghazchay	20	0.21	35	Gazakh	
3	Khatinli	1962	Out of course (Tovuzchay)	4.1	0.75	14.7	Tovuz	
4	Jayir	1982	Rain-water	3.5	0.26	9	Shamkir	
5	Inja Su	1988	Thin water	2.6	0.26	26	Gazakh	
6	Akhinjachay	1966	Akhinjachay	14	0.92	42.5	Tovuz	Near to occupied lands

Figure 7. Water reservoirs with the volume of over 2 million m^3 (Odjagov, 2008)

3.2.4.2. Drinking water abstraction

The surface and ground water resources are used in order to supply Ganja city with drinking water. The fresh water pipeline starts from the area Gizilgaya, which is located in Topalhasanli village near the Ganjachay. The water is taken from Goygol area as well.

The Table 11 shows the amount of ground water used in water supply of the Ganja city.

Table 11. The total amount of ground water used for Ganja water supply system

Ground water	Consumed ground water, thousand m^3/day

	Fresh water	Moderately Saline water	Total
Gizilgaya artesian water	6.80	-	6.80
Exploited artesian wells [2]	67.5	15.5	83.0
Underground water line[3]	26.0	2.50	28.5
Total thousand m^3/day	*100.3*	*18.0*	*118.3*
Total million m^3/year	36.6	6.6	43.2

(Source: Azersu National Water supply and Sanitation Programm, 2011)

In Gazakh city Joghazchay horizontal infiltration gallery, Agstafachay horizontal infiltration gallery below the Didaban water reservoir, Shir-shir spring and 6 wells are considered as main drinking water resources.

The main water pipeline Joghazchay built in 1994-95 is only supplying the city with water. The pipeline installed through the surface on the Joghazchay River channel and it is corroded now. Azersu noted that the pipeline is damaged as a result of floods/(Source:Tovuz region office of Azersu).

The main water pipeline Didaban was installed in 2008. It is in good condition and its exploitation is planned for the future as well.

Due to the fact that the amount of water in water sources reduced in summer time, only 60% of above mentioned consumers are adequately supplied with water.

Gazakh Water channel Department had noted during a visit to the area that, in summer months it is impossible completely to provide the demand for water for all consumers. This scarcity of water can last up to 6 weeks and can be as low as 60% of existing demand. In order to stabilize the water supply, the irrigation water is limited by the instruction of the local executive authority.

In Agstafa rayon by the beginning of 2014 water supply system has been rehabilitated. Water supply is being carried by 6 sub artesian wells near Vurgun village. Waste waters are treated in WWTP located near Poylu village and used for irrigation purposes after treatment.

In Samukh rayon the main drinking water sources are 15 independent sub artesian wells which are located directly in the city.

There is no centralized water treatment system. Water is delivered directly to the consumers without any treatment process. It is a serious risk to human health.

Water was also transferred to the city gathered from the springs located outside of the city (Garghish Mountain underground water-supply – 12 km, Jayir River (underground water-supply) – 7 km, underground water-supply №1 and №2 – 5 km away from the city) through the tailraces. These tailraces are closed now, coming up with their own flow channels that installed in 1850-1928.

Under new National WSS rehabilitation project waters of Shamkirchay reservoir through the underground concrete pipes will be delivered to Shamkir and Ganja cities by the end of this year or in 2015. This will

[2] unused artesian wells are distinguished as old or useless because of other reasons

[3] probably due to the use of underground water-supply systems

also improve drinking water supply in Ganja city. (Source: National Water Supply and Water Sanitation Project for Shamkir rayon. Feasibility Study Report. Amelioration and Water Economy JSC. 2010. Region plus magazine, No. 01 (01), 24 February 2006; No. 02 (02), 06 March, 2006, Baku-2006., and on April 15, 2007, Baku).

By information of Tovuz office of Amelioration JSC water supply of Tovuz city also according to the National WSS rehabilitation program is under completion and will be fully operational by end of the year of by 2015 by use of Zayamchay river bed waters. New WWTP (near Girzan village) is supposed to treat waste waters and discharge them into nearby located lowland area.

3.2.5 Waste water discharges

3.2.5.1. Urban waste water

The total volume of waste waters produced in residential settlements of the pilot river basin in 2012 was 51,4 mln m^3 (Table 12).

Table 12. Annual waste water in the residential settlements[4] (in million cubic meters)

Regions / Years	**2000**	**2005**	**2010**	**2011**	**2012**
Pilot area- total	**6.6**	**28.7**	**35.5**	**31.1**	**51.4**
Ganja city	0.01	19.0	12.3	9.5	9,2
Gazakh Rayon	0.5	0.4	0.8	0.6	0,6
Agstafa rayon	0.3	0.5	0.1	0.1	0,2
Tovuz rayon	-	0.2	0.95	0.8	0,8
Shamkir rayon	4.9	8.0	8.6	7.4	28,0
Gadabay rayon	0.1	-	0.4	0.1	0,0
Dashkasan rayon	0.7	0.3	0.1	0.2	0,2
Samukh rayon	-	0.2	0.11	0.1	0,1
Goygol rayon	0.1	0.1	12.0	11.9	11,3
Goranboy rayon	-	-	0.1	0.5	0,7

(Azerbaijan State Statistics Committee, 2013)

The sewerage system of **Gazakh city** was built in 1970 and for the moment is not sufficient to serve all residents. Most of the waste water collection system is outdated and needs to be replaced. There are lots of defects and damages in pipes. WWTP with the capacity of 2 800 m^3/day was built in 1970-1973. The

[4] According to information obtained from Melioration and Water Industry OJSC

plant is in extremely poor condition and existing structures are completely unusable. Wastewaters are discharged into the Agstafachay River without treatment.

Waste water collection system of **Shamkir rayon** is very simple and there are only 3 operational collectors, other collectors are not operational. It should be noted that these collectors are not registered in the balance of Water - Sanitation Agency (Azersu). Domestic wastewaters are discharged directly to the soil through septic tanks. It causes contamination of the ground waters, as well as poses serious threat for public health. As there is only one observation station, therefore it is difficult to assess human impact along the Shamkirchay River.

There are 1754 household connections, 9 trade and industry connections and 38 other organizations connections. The level of connection is approximately 30% in Shamkir rayon, the rest have individual septic tanks. These tanks are pumped out by JSC "Azersu" on a paid basis and upon application.

Figure 8. Existing WWTP in Shamkir city (Phpto by EPIRB project, 2012)

As new WWTP near Gara Nuyu village is being constructed more areas will be connected in the system and registration of waste waters is already ongoing.

Currently there is no waste water collection and treatment systems in **Samukh city.** Domestic wastewaters are discharged to the soil through septic wells. It causes contamination of the ground waters, as well as posing a serious threat for human health.

The waste waters of **Goygol city** are directed to the waste treatment plant built in the eastern part of the city, nearby the Mollacelilli village in 2008. After treatment the waste waters are used for irrigation**.** At the end of the agricultural season treated waters are stored in reservoirs and evaporated.

Most parts of **Ganja city** are connected to the sewage system (except some new production fields). The major collector of Ganja city is directed to the area located in the northern part of the city, nearby Ziyadly village. This WWTP was built in 1970 and currently is not in operation. WWTP is placed directly near the Ganjachay water basin. Wastewaters are transmitted from Ganja city to the Kurakchay basin in the edge of the Ganjachay basin.

As there is only one observation station on each of pilot rivers, therefore it is difficult to assess human impact along the river.

It should be finally noted that settlements living near passing rivers, including all 4 pilot rivers locally discharge their waste waters into these rivers. In this regards waste waters from residential areas located near of all these pilot river basins may have impact to their water quality.

As waste waters of Tovuz city is currently discharged into the Tovuzchay River and Gazakh city is discharged into the Agstafachay River, those river reaches (below the effluents) are highly impacted.

In Figure 9 is shown map of location of some WWTPs and landfills in selected 4 pilot river basins.

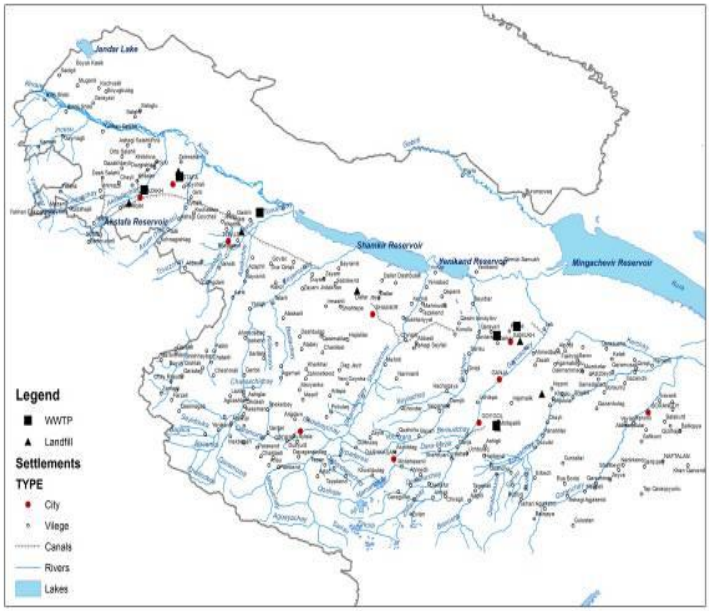

Figure 9. Map of location of some WWTP and landfills in selected 4 pilot basin rivers

Figure 10. Impact of Dashkesen marble deposit on the quality of Qoshkarchay River water

As explained above, under the National Water Supply and Sanitation program the work is ongoing to construct new WWTPs for Gazakh and Tovuz rayons.

After WSS of above rayons are operational there will be need to continue monitoring of relevant water bodies affected by them to observe if improvement of water bodies status is occurring . (Photo by EPIRBproject 2013)

3.2.5.2. Industrial and mining waste waters

Official information on the amount of water discharged into water sources is not accessible.

Meanwhile as it is noted in the text above (subchapter 2.2.2), there are industrial enterprises and ore mines in the pilot area (see Figure 10).

Little pieces of marble dissolve in the river water and change its color.

In addition to industry impact to the Ganjachay River it should be noted that industries located in Tovuz and Gazakh cities (mainly small food industries) are discharged into sewerage waste water systems and through them impact to water quality of the Tovuzchay and the Agstafachay rivers. Almost the same level of pollution comes from small industries located in the Shamkirchay river basin.

3.2.6. Flood protection

In recent years several floods were recorded in the pilot river basin. Their economic, social and ecological consequences are significant and have caused huge damages on the properties and even with a number of losses of human lives. Expected climate changes will lead to that high runoff become more frequent and large-scale [Akhmedov B. M., et al. 2008, Todua Z., 1995].

It is impossible to prevent such floods completely due to the unexpected occurrence mainly the short-term floods in rivers. However, certain reduction of damage occurred as a result of floods is possible through application of effective methods and measures.

Engineering methods are traditional methods, which are widely used around the world for flood management. Basically they are::

- construction of reservoirs;
- management of river basins;
- strengthening of river banks;
- cleaning riverbeds from siltation and sediments;
- branch of flood waters in special places.

Information about bank strengthening activities planned at the moment and for the future aimed to protect the rivers from the floods, as well as cultivated areas and residential settlements within the basin of the river is presented on the Table 13 and Figure 11.

Table 13. Foods and mudflows bank protection constructions of the rivers

№	Name of the rivers	Protection zones		Length of protective dam (km)	Projected for construction (km)	Including	
		Sown areas, (hectare)	Residential areas (quantity)			the first turn (km)	Planned for the future (km)
1	Agstafachay	600.0	1	15.0	14.43	2.0	12.43
2	Ganjachay	150.0	1	18.0	18.0	-	18.0

3	Akhinjachay	210.0	2	19.0	19.0	-	19.0
4	Tovuzchay	180.0	1	18.0	18.0	-	18.0
5	Asrikchay	160.0	1	14.0	14.0	-	14.0
6	Dzegamchay	340.0	1	17.0	17.0	1.0	16.0
7	Jagrichay	110.0	-	15.0	15.0	-	15.0
8	Shamkirchay	410.0	2	22.0	22.0	-	22.0
9	Koshkarchay	80.0	-	10.0	10.0	-	10.0
10	Hasansu	130.0	-	11.0	11.0	-	11.0
11	Kurakchay	145.0	-	12.0	12.0	-	12.0
12	Goranchay	290.0	1	16.0	16.0	-	16.0
	Total	**2805.0**	**10.0**	**187.0**	**186.43**	**3.0**	**183.43**

(Source: Azerbaijan Amelioration JSC 2010, Ahmadzadeh 2010)

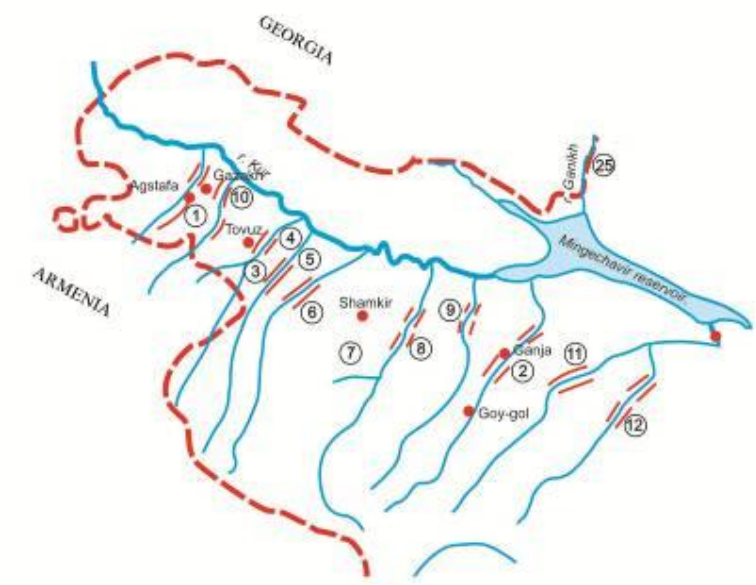

Figure 11. Flood protection facilities in river banks [Objagov, 2008]

Figure 12. Construction of Shamkirchay hydropower station (HPP)

(Photo by EPIRB project 2013)

3.2.7. Hydropower generation

In 30-40 years of the last century small hydroelectric power stations were constructed on the rivers in the pilot river basin. The hydropower station of capacity of 50 KW is constructed on the river Qoshkarchay. It is constructed below Zagala villaqe (63 km from the mouth). Below a dam from the river the channel for hydroelectric power station work branches off. The used water arrives back in the river Qoshkarchay.

The hydropower station was constructed in the village Zurnabad in 1927. The length of dam is 25 m, width - 3 m and a pressure - 1 m. Volume of a reservoir is 900 m^3. The used water arrives back in the Ganjachay River. In 1953 after construction of Mingechevir hydroelectric power station on the Kura River, small hydroelectric power stations have lost the value and their operation was stopped. Now construction of the new small hydropower stations to explore the capacity of the small rivers hydraulic power is planned (see Annex 16).

Shamkirchay water reservoir is designed for irrigation without consumption of power. However, at the same time it is planned to construct 3 hydro power stations to generate additional electric power by using hydraulic potential of the river water with following parameters (see Figure 12):

- HPS capacity: 24438 KWt
- Annual energy production: 56 million KWt/ hour

3.2.8. Solid waste disposal

The situation in the waste disposal of the pilot river basin causes serious dangers. Based on the available information, the Integrated Waste Management Project in Ganja city is conducted jointly with the executive bodies of the city, Ministry of Economic Development of Azerbaijan and German Bank KFW.

In other cities of pilot river basin no such activities have started on implementation of the Solid Waste Management System. Wastes are disposed illegally to different locations. Existing landfills do not meet requirements defined by the EU Directives and international standards. The data on the collected volumes of domestic solid waste from the different rayons are presented in Table 14.

*Table 14. Overall values of municipal solid waste collection, thousand cubic meters**

Cities and administrative raions	**Years**				
	2005	**2009**	**2010**	**2011**	**2012**
Ganja City	252,0	315,0	421,0	421,5	416,8
Rayon	26,8	38,2	38,5	39,0	38,8
Aghstafa rayon	14,0	25,1	25,2	25,8	28,5
Tovuz r rayon	7,6	9,5	11,0	12,8	13,4
Shemkir rayon	8,3	29,3	17,8	18,0	22,9
Gadabay rayon	2,6	3,4	0,1	0,1	0,1
Dashkasan rayon	2,6	4,7	2,8	2,8	2,9
Samukh rayon	10,2	4,1	6,8	6,8	1,8
Goygol rayon	8,7	24,2	21,0	22,2	22,0
Goranboy rayon	15,0	17,5	19,6	33,2	18,1
Naftalan city	…	26,0	14,0	14,2	22,5

** Because of the lack of waste weighbridges in currently operated dumpsites in the country, waste amount is mainly calculated based on capacity of waste trucks in cubic meters.*

(Source: Azerbaijan State Statistics Committee, 2013)

More detailed information on solid waste management in all rayons of pilot river basin is included in Annex 15.

3.2.9. Automobile transport

More than 200 km of the Eurasian transport corridor passes through this region. The most significant railway line is Baku-Tbilisi. The railway line was given to exploitation in 1883.

The most significant road is Baku-Ganja-Tbilisi. The road is lying in parallel with Baku-Tbilisi railway line. The highway line is Shamkir-Gadabay, Ganja-Dashkesen and Goranboy-Agcakend motorways connecting the area with the mountainous areas.

Oil products transported via above mentioned railway lines and motor roads spill in the result of problems in vehicle and accidents and eventually it may lead to the pollution of river waters.

In summer most of residents of the villages located along the river wash their cars in the river. It leads to the pollution of the river with the oil products.

As there is only one observation station on each of pilot rivers, therefore it is difficult to assess direct impact of car washing in the river, but existing monitoring data shows that amount of oil products often is high in rivers.

3.2.10 . Tourism

Favorable climate conditions, clean air, mountain and forest landscape, therapeutic mineral water resources allows to create health resorts for treatment and recreation. During the last year there is also visible trend to spend summer time in this region for the people from large cities in the natural camps, where no regulation measures are taken (mainly water supply and sanitation). Such trend may contribute to the water resources deterioration mainly in the mountain parts of the pilot river basin. There are not available any data on this situation. Therefore, it can be only expected certain pressure from such human activity.

3.3. Water Management Issues

Based on the IMRPRESS methodology as well as findings of the updated river basin analysis study the water management issues were identified for the Central Kura BD. They are related to pollution from point and diffuse sources and hydromorphological alterations as it is presented in Table 15.

Table 15. Typical water management issues for the Central Kura BD

		River	*Lake*	*Groundwater*
	Pollution			
1	Households: wastewater discharges	x		x
2	Industries (including mining): wastewater discharges	x		x
3	Agriculture: use of fertilizers, loads of nutrients	x		x
4	Dump, storage sites (including mine tailings)	x		x
5	Transport: spills, emissions	x		
6	Tourism			
	Hydromorphological alterations			
7	Abstraction (agriculture, industry, household, hydropower)	x		x
8	Hydropower works	x		x
9	Fish farming	x		
10	Agricultural activities			x
11	Urban settlements	x		x

12	Industrial areas	x		x
13	Flood protection	x		
14	Gravel /Sand extraction	x		x
15	Damming for flow regulation including hydropower generation	x		

Identified water management issues were analyzed and prioritized and as result 9 significant water management issues were selected (see Table 16).

Table 16. Significant water management issues for the Central Kura BD

	Water management issue
1	Untreated wastewater discharges from urban sewer systems (or combine sewer systems that means both urban and industrial)
2	Untreated wastewater discharges from industries
3	Loads of agricultural fertilizers
4	Disposal/dumping of solid household wastes
5	Sand and gravel extraction
6	Water abstractions for irrigation
7	Water abstractions by water supply systems
8	Water abstractions by HPPs
9	River regulation: damming, channeling, flow regulation

3.4. Pressures and Impacts on surface waters

In the he Central Kura RBD pilot study has been conducted in basins of 6 main rivers that are Ganjachay, Shamkirchay, Zayamchay, Goshkarchay, Tovuzchay and Agstafachay (see Fig. 13). For the purpose of the Pressure and Impact Analysis it was decided to make assessment separately for each sub-basin. Such assessment would give a clue on the impact of different pressures on the individual water bodies and also on the whole sub-basin. Based on the river basin analysis (both natural conditions and human activities) and the data from the JFSs (2013 and 2014) and national monitoring programme the pressures and impact were assigned to the significant water management issues that were divided into two groups (pollution from point and diffuse sources and hydromorphological alterations).

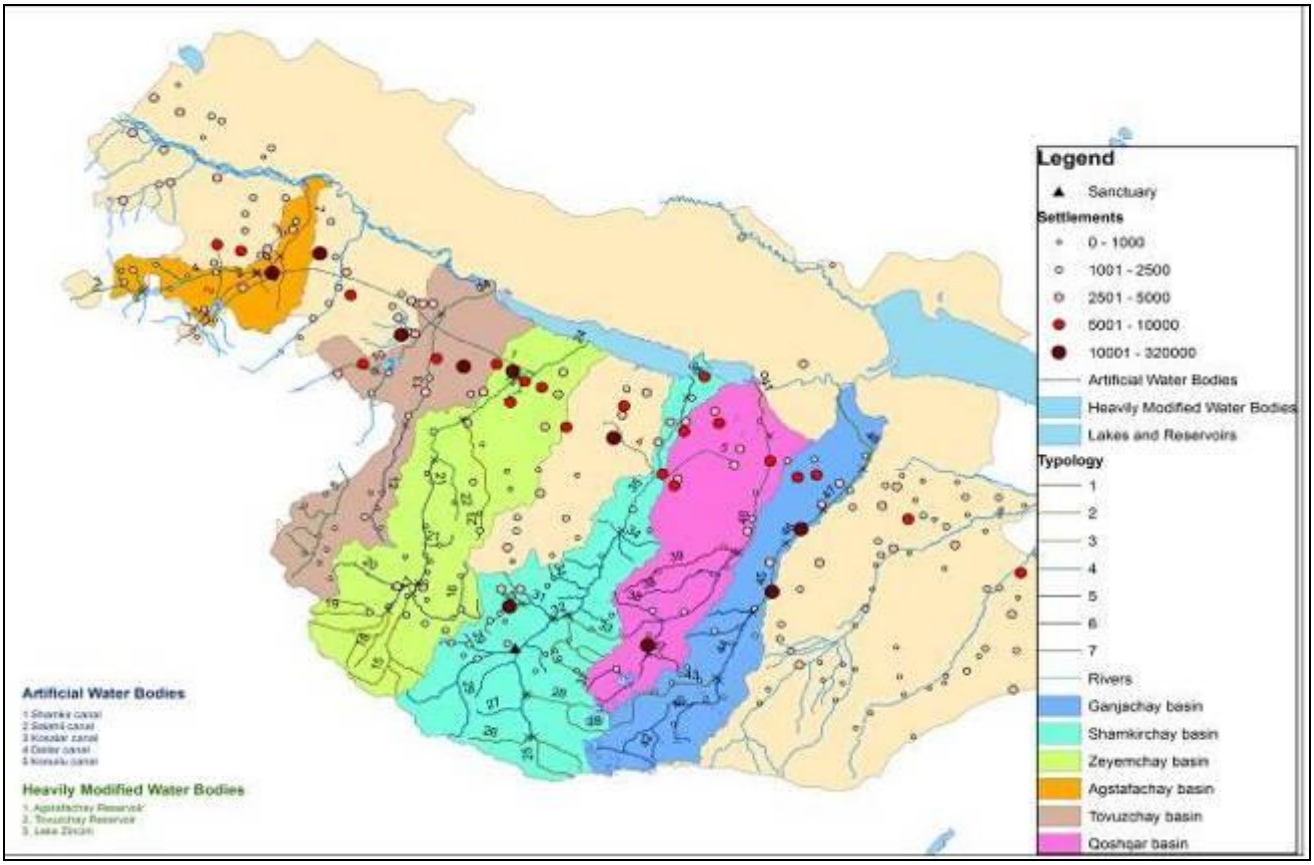

Figure 13. Subdivision of the Central Kura BD into sub-basins

3.4.1. Surface Water Pollution Pressures and Impacts

Regarding the pollution of surface water in the Central Kura BD the main sources are the untreated waste waters from large cities and also small settlements may have impact on the water quality via direct discharge of the waste waters from the households to the river. As it was found during the JFS field work and investigations uncontrolled disposal of solid wastes can significantly contribute to the deterioration of surface water quality as well (many of the dump sites are located on the river banks).

Based on the data available from the national monitoring programme and from the two JFSs rounds analysis of the sub-basins was conducted. The results are presented in the Table 17.

Table 17. Surface water pollution pressures and impacts in the Central Kura RBD

River	*Type of pressure*	*Specific pressure*	*Impact*	*Comment*
The Ganjachay river sub-basin				
Ganjachay from Topahasanli settlement up to Goygol city	Diffuse source of pollution	Untreated waste waters from the small settlements (without canalization) and agricultural	Increased amount of degradable organic matter and nutrients; Changed habitat and composition of	*Houses are constructed directly on the bank and some of discharge waste water to the river. Furthermore,*

		activities	aquatic biota	*during the rain period wastes are washed out from the surface area to the river as well.*
Ganjachay from Goygol city up to the mouth	Point sources of pollution	Untreated waste waters from Goygol and Ganja cities	Increased amount of degradable organic matter, nutrients and specific compounds; Degraded habitat where aquatic biota can not survive	*From Ganja to mouth of the river only small volume of waste waters (both treated and untreated) is in the river*
Qoshakarchay river sub-basin				
Qoshkarchay below Bayan (from Met factory) up mouth	Point and diffuse sources of pollution	Untreated waste waters from the settlements and from the factory	Increased amount of degradable organic matter, nutrients, heavy metals and suspended solids; Degraded habitat	*Muddy water with brown colour and substrate (stones) is covered by the thick layer of silt.*
Shamkirchay river sub-basin				
Gadabaychay from Gadabay city up to confluence with Shamkirchay river	Point sources of pollution and diffuse source of pollution	Untreated waste waters from the settlement and solid wastes	Increased amount of degradable organic matter, nutrients and other specific substances, solid wastes; Degraded habitat	*During the JFS (2014) no macroinvertebrates were found and substrate was covered by the filamentpous algae and thick layer of biofilm.*
Shamkirchay below Shamkir up to mouth	Point sources of pollution and diffuse source of pollution	Untreated waste waters from the settlement and solid wastes	Increased amount of degradable organic matter, nutrients and other specific substances, solid	*During the JFS (2014) only tollerant macroinvertebrates taxa were found in the sampling*

			wastes; Degraded habitat	*location Shamkirchay – highway bridge.*
Zayamchay river sub-basin				
Zayamchay below Khonogalo up to mouth	Point sources of pollution and diffuse source of pollution	Untreated waste waters from the settlement and solid wastes	Increased amount of degradable organic matter, nutrients and other specific substances, solid wastes; Degraded habitat	*During the JFS (2014) only tollerant macroinvertebrates taxa were found.*
Tovuzchay river sub-basin				
Tovuzchay below Tovuz city up to mouth	Point sources of pollution and diffuse source of pollution	Untreated waste waters from the settlement and solid wastes	Increased amount of degradable organic matter, nutrients and other specific substances, solid wastes; Degraded habitat	*During the JFS (2014) only tollerant macroinvertebrates taxa were found.*
Agstafachay river sub-basin				
Agstafachay below Agstafa city up mouth	*Point sources of pollution and diffuse source of pollution*	*Untreated waste waters from the settlement and solid wastes*	*Increased amount of degradable organic matter, nutrients and other specific substances, solid wastes;* *Degraded habitat*	*During the JFS (2014) only tollerant macroinvertebrates taxa were found.*

Based on the analysis of the pollution impact on the surface water bodies (Water Body Delineation Study) they have been aggregated into groups (same type and identified pressures). However, in the Risk Assessment analysis will be conducted for each surface water body.

3.4.2. Hydromporphological Pressures and Impacts

The main pressures were identified as being water abstraction (for irrigation and households), dredging sand and gravel from the river bed and also river regulation. The results of the analysis are summarized in

the Table 18. The analysis was conducted on the available data from the JFSs, hydrological monitoring and historical data sets (also official statistics published each year were used).

Table 18. Hydromorphological pressures and impacts in the Central Kura BD

River	*Type of pressure*	*Specific pressure*	*Impact*	*Comment*
The Ganjachay river sub-basin				
Ganjachay from Topahasanli settlement up to mouth	Reduction of the river flow, river regulation	Water abstraction for the irrigation purposes and settlements; dredging material and HPP	Changes in water flow regime, water temperature, dissolved oxygen and increased algae growth. Degraded habitat where aquatic biota can not survive	*From Ganja city to mouth of the river only small volume of waste waters (both treated and untreated) is in the river.*
Qoshakarchay river sub-basin				
Qoshkarchay below Bayan (from Met factory) up mouth	Reduction of the river flow, river regulation	Water abstraction for the industrial purposes and also for irrigation in the downstream parts of the sub-basin area.	Changes in water flow regime, water temperature, dissolved oxygen and increased algae growth. Degraded habitat where aquatic biota can not survive	*Only small amount of water was measured in the downstream part of the river.*
Shamkirchay river sub-basin				
Shamkirchay below Shamkir up to mouth	Reduction of the river flow, river regulation and dredging material	Water abstraction for the irrigation purposes and settlements (two irrigation cannals); dredging material	Changes in water flow regime, water temperature, dissolved oxygen and increased algae growth. Degraded habitat where aquatic biota can not survive	*Only small amount of water was measured in the downstream part of the river.*
Zayamchay river sub-basin				
Zayamchay below Yaniqli to	Reduction of the river flow	Water abstraction for the irrigation purposes and	Changes in water flow regime, water temperature,	*Significant reduction in the river flow was*

Khonogalo		settlements; dredging material	dissolved oxygen and increased algae growth.	*observed during the field work*
Zayamchay below Khonogalo up to mouth	Reduction of the river flow	Water abstraction for the irrigation purposes and settlements; dredging material	Changes in water flow regime, water temperature, dissolved oxygen and increased algae growth. Degraded habitat where aquatic biota can not survive.	*Only small amount of water was measured in the downstream part of the river.*
Tovuzchay river sub-basin				
Tovuzchay below Tovuz city up to mouth	Reduction of the river flow and rive regulation	Water abstraction for the irrigation purposes and settlements; dredging material	Changes in water flow regime, water temperature, dissolved oxygen and increased algae growth. Degraded habitat where aquatic biota can not survive.	*Only small amount of water was measured in the downstream part of the river.*
Agstafachay river sub-basin				
Agstafachay below Agstafa reservoir up to mouth	*Reduction of the river flow, river regulation*	*Water abstraction for the irrigation purposes and settlements; dredging material*	*Changes in water flow regime, water temperature, dissolved oxygen and increased algae growth.* *Degraded habitat where aquatic biota can not survive.*	*Only small amount of water was measured in the downstream part of the river.*

For illustration, total water resources of the pilot river basin are 1.2 -14 billion m^3. Water abstraction in the pilot river basin was about 1072 million m^3 in 2012 of which 222 million m^3 was lost during transportation and 850,5 million m^3 has been used for different sectors.

Table 19 shows summarized volumes of abstracted water in the Ganja – Gazakh region.

Table 19. Water abstraction in Ganja - Gazakh region

Ganja-Gazakh economic region-total	**850,5**
Ganja t.d.	17,4
Gazakh rayon	58,6
Agstafa rayon	77,6
Tovuz rayon	94,6
Shamkir rayon	168,0
Gedabey rayon	0,2
Dashkesen rayon	0,3
Samukh rayon	148,0
Goygol rayon	64,1
Goranboy rayon	221,3
Naftalan t.u.	0,5

(Source: Azerbaijan Statistics Committee 2013)

3.4.3. Climate change and its impact to water resources

Ganja- region has a dry, warm climate in the plains, temperate-warm and steppe-dry winter climate type in the lowland. In the mountain area the climate is cold and humid. Average annual temperature is 11.8-13.0 ^{0}C. Average annual precipitation ranges between 250 - 500 mm.

Average temperature in July is 23-26 ^{0}C, absolute maximums are 37-40 ^{0}C. The winter is temperate warm. Average temperature in January is 0 ^{0}C. Average number of absolute minimums is 6-10 ^{0}C frost. Duration of period without frost is 220 - 250 days. Amount of annual precipitation is 240 - 390 mm.

In highest mountainous area the climate is cool. The summer is correspondingly cool. Average temperature in July is 17-23 ^{0}C. In winter the weather is cool and snowy. Average temperature in January is 3^o, average number of absolute minimums made 14-15 ^{0}C frost. Duration of period without frost is 180 - 220 days. Long continued snow blanket of more than 1300 - 1400 mm is also observed (more than 60 days). Humidity of this area is evaluated as enough. Amount of annual precipitation is 550 - 630 mm/Museyibov,1998/.

In order to evaluate change of climatic conditions of the territory and its impact to status or water resources of the territory the comparison of annual and seasonal air temperature and precipitation for the periods of 1961-1990 and 1991-2012 has been estimated by us.

Below is given change of air temperature and precipitations in some meteorological stations and Ganjachay river run-off(where highest flow reduction is observed for above periods (Tables 20)

Table 20. Difference of air temperature (^{0}C) and precipitations(mm) in meteorological stations and run- off of the Ganjachay River at Zurnabad (%) station between the periods of 1961-1990 and 1991-2012

Meteoelements	Winter XII-II	Spring III-V	Summer VI-VIII	Autumn IX-XI	Annual XII-XI
Dashkasan station					
Temperature	0,9	1,5	1,4	0,5	1,1
Precipitation	-18,4	-2,3	-4,6	4,6	-3,8
Ganja station					
Temperature	1,1	0,7	1,2	0,8	1.0
Precipitation	-19,8	-4,3	-23,9	8,5	-10,7
Gadabay station					
Air temperature	0,2	0,4	1,2	0,8	0,7
Precipitation	-6,2	10,2	1,6	6,6	4,4
Ganjachay- Zurnabad water discharges					
Run-off	-5	-14	-25	-8	-19

As one can see from the above table even in spite of increase of precipitations in Gadabey station the increase of air temperature for 0.7 ^{0} C annually leads to reduction of run- off of the Ganjachay River. In other meteostations precticipations are reducing.

Reduction of run- off is observed almost in all months of the year except February and March when increased air temperature leads to increase of run-off in result of snow melting in the basin(see Figure 14)

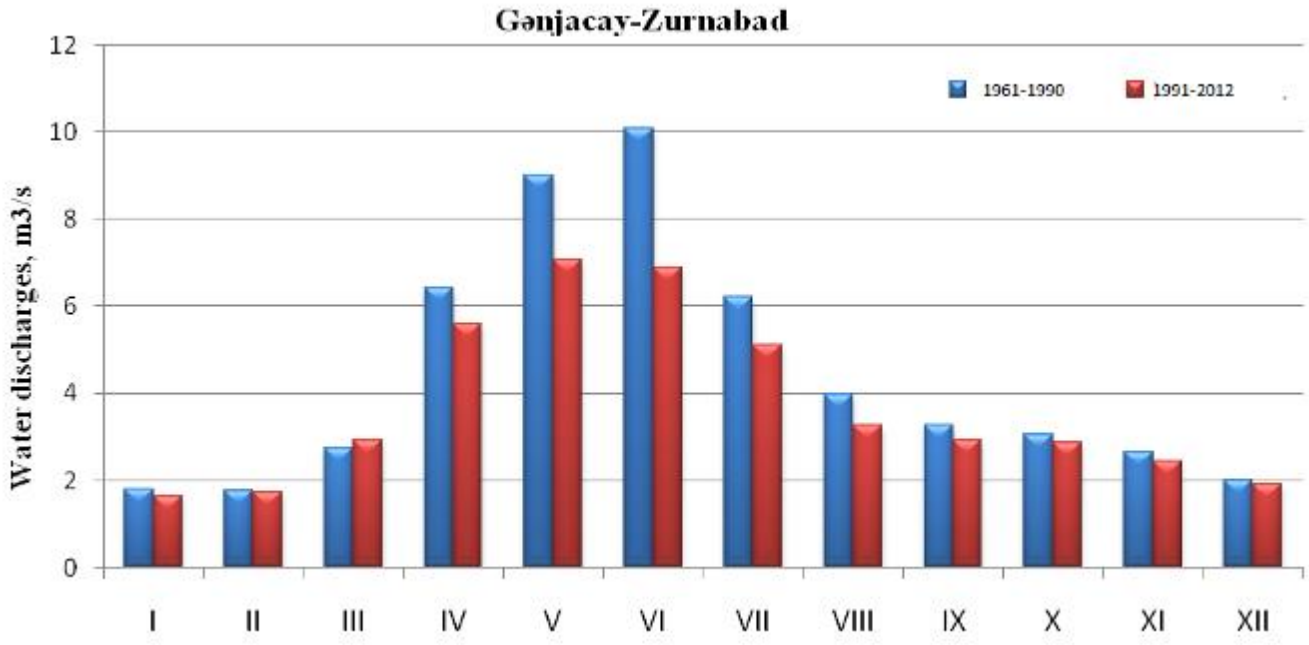

Figure 14.Change of water discharges of the Ganjachay river during the periods 1960-1990 and 1991-2012

In other rivers of Central kura BD almost the same situation is observed, but butflow reduction was lesser than one in Gabjachay.

Increase of air temperature leads reducing the level and reserves of ground waters(as result of flow reduction and also increase of evoparation from earth surface).

Current water balance of surface and ground waters in the region and also prediction of their reduction by use of different climate scenarios used by National Climate Change of Azerbaijan (GISS, GFDL, HadCM3) is given in below table 21(Source: Second National Communication on UNFCCC by Azerbaijan Climate Change Center of MENR ,2010).

Table 21. Surface and Ground water use balance

Water balance	Water balance	
	Existing mln.m^3	Expected by scenario(2050)
Surface water balance		
Surface water resources	+ 1400	+1200
Surface water abstraction	-850	-950
Required environmental flow	-550	-550

Balance	0	-300
Water conservation measures		
Surface water use balance	0	-300
Reduction of water losses during extraction , transportation and use	350	350
Treatment and use of waste waters	50	50
Balance	+400	+100
Ground water balance		
Ground water exploitation reserves	+1400	+1300
Ground water abstraction	-350	-650
Balance	+1050	+650
Total balance of Surface and Ground waters		
Total balance	+1450	+750

As one can see from above table currently total surface water resources can meet water abstraction and environmental flow requirements only if they are used adequately and distributed by seasons according to these requirements. According to above assessment of future water balance it should be noted that because of flow reduction in result of impact of climate change and increase of water abstraction potential water resources won't meet water demands without implementation of measures on water demand management and water conservation.

By our calculation through implementation of some measures on water conservation and treatment and reuse of waste waters (in irrigation of for technical purposes) should be reduced water deficit in the Ganja- Gazakh region(result by climatic changes and water use impacts). This can be seen from above table..

Region has enough ground water reserves and by increasing of their use in future as an alternative source of water can be solved water scarcity problem (see table 21). This can be done in low flow periods in the river and when available water resources don't meet water use and environmental flow requirements. As one can see from the table in spite of impact of climate changes on total water resources of ground waters (5-7% reduction) and even in doubling of ground water abstraction there still will be available enough ground water reserves to protect them from deterioration.

In conclusion it should be noted that reduction of surface water loses and treatment and use of waste waters in agriculture may allow to solve surface water scarcity problem now and in the future. But as

surface water resources aren't distributed equally in the year therefore in order to provide water supply and to keep needed environmental flow in rivers there is need to develop some sceneries on use of ground waters locally in low flow periods(capacity of which is quite enough to do this), possibility of construction of some new water regulation infrastructure(like increase of capacity of reservoirs) and for sustainable seasonal water demand management

3.5. Pressure and impact on ground waters

3.5.1. Ground Water quality in Ganja- region

There is sufficient amount of groundwater monitoring points in Central KuraBDbut digital monitoring data exists only for the 3year period: 2005, 2006 and 2011 Hydrogeological Expedition declares that there exists 52 monitoring wells in Ganja area, of them 27 wells installed into shallow aquifers, and 25 in artesian aquifers/(National Geologyical Exploration Service ,MENR, eco.gov.az) /.

These numbers have to be checked as it was discovered during the JFS organised by EPIRB project that some of monitoring wells are destroyed and cannot be used for groundwater monitoring anymore. However,theoretically, the number of monitoring points is sufficient and classification information confidence should be high.

As it has been reported by EPIRB project mentioned above, that where there are insufficient data to conduct a particular test, then in the absence of contrary information, the groundwater body should be assigned good status for that test, but with low confidence in this assessment.

Additional monitoring and/or investigation should be put in place so that the test can be properly conducted at the next round of classification.

Five control groundwater samples were collected in Central KuraRBD in October 2013. They were analyzed in the laboratory of Ministry of Ecology and Natural Resources and results are presented in the table 22.

Table 22. Results of Ground Water quality analyses from JFS by EPIRB project.

Component	Well near Aluminium factory	Well in Ayibli village	Flowing well in Tovuz	Flowing well in Duzgiriqlı village	Exploitation well in Duzqırıqlı village
pH	7,07	7,27	7,68	7,26	7,75
T, °C	19,2	17,9	12,7	18,2	15,5
Transparency, cm	5,0	18,0	30,0	30,0	30,0
Oxygen saturation, %	39,6	85,1	51,3	57,3	62,1
Conductivity, mS/cm^2	5,08	0,453	0,75	0,579	0,834
Dissolved oxygen, mg/l	3,8	7,7	4,7	5,2	5,7
Total suspended solids, mg/l	170,00	13,00	3,00	2,05	2,01
BOD_5, mg/l	1,43	0,91	0,52	1,36	1,60
N-NH_4, mg/l	0,53	3,63	0,60	0,19	0,83
SO_4, mg/l	1844,3	19,2	122,9	96,1	115,3
Cl, mg/l	219,1	22,0	28,4	11,9	29,1
N-NO_3, mg/l	0,38	0,06	2,68	0,77	3,10
N- NO_2, mg/l	0,13	0,01	0,006	0,006	0,01
PO_4, mg/l	0,030	0,120	0,050	0,330	0,140
Cd, µg/l	<0,15	<0,15	<0,15	<0,15	<0,15
Cu, µg/l	<0,11	4,27	<0,11	4,37	5,55
Ni, µg/l	0,30	0,07	1,07	1,06	0,29
Pb, µg/l	<0,06	<0,06	<0,06	<0,06	<0,06
Zn, µg/l	165,00	2,63	0,65	0,31	1,63

(Source: EU EPIRB project 2014)

Components and indices exceeding groundwater standards are highlighted in yellow.

In the monitoring well near Ganja aluminium factory groundwater conductivity and concentration of sulph ates are rather high, indicating local groundwater pollution from the waste site. In the monitoring well of Ayibly village ammonium concentrations are 7 times higher than drinking water norms and this indicates agricultural pollution.

In addition, this is not a surprise because monitoring well is located in the garden of the local farmer.

For the management purposes, WFD requires to delineate, characterize and classify groundwater bodies (further GWB). GWB delineation and characterization has been conducted in March-August, 2013 and described in the separate reports [EPIRB project 2013]. In this report groundwater body classification is presented.

The aim of groundwater body classification is to establish the quantitative and chemical status of each grou ndwater body. Groundwater classification is based on analysis by EPIRB project of all available environmental data - geological, hydrological, and chemical, etc. In addition to that, an impact

of human activity has to be also examined. Main human pressures, which may influence groundwater body status, are:

- diffuse sources of pollution;
- point sources of pollution;
- abstractions, and
- artificial recharges.

Comprehensive classification of groundwater body status was hindered by the lack of data, in particular quantitative and chemical monitoring time series data showing past and current trends.

3.5.2. Anthropogenic loads and impacts to ground waters

Potential ground waters pollution sources include areas where pollutants can enter aquifers through surface waters, and various industrial and agricultural wastes are discharged, collected and stored at storages or fields (sludge collectors, ash-spilled place, filling reservoirs, basins, infiltration fields, etc.), agricultural irrigation areas (where fertilizers and pesticides are utilized), areas mining works and geological-exploration works and others are carried out.

Pollutants are divided into the followings according to their origin and quality:

-domestic (economy – phenol);

-industry (production);

-agriculture;

-with floods.(during which waters wash surface areas with significant pollution and transport pollutants to other areas, where they infiltrate into ground).

According to their chemical compositions pollution of ground waters takes place through chemical, bacteriological, radioactive and thermal ways. Ground waters pollution occurs through each of the aforesaid ways. But, chemical pollution is considered a feature that is very dangerous and difficult to remove.

3.5.2.1 . Pollution with domestic wastes

Big cities, settlements and villages of the republic are usually located in foothill plains, terraces, upper parts of river cones – i.e. where rock in aeration zones are water permeable. In other words, ground waters in such areas have no natural protection from pollution. No cities, except for some bigger ones such as Baku, Sumgait, Ganja, Nakhchivan, etc., have sewerage and wastewater treatment systems. Therefore in those areas not covered with waste water collection system waste waters filtrate into ground and impact ground waters of nearby areas or flowing by earth surface enter into surface and ground waters. Domestic and industrial wastewaters of Ganja are discharged to vineyards located in Garayeri field in nearly 18 km distance in the north-east of the city, was used for irrigation after biological treatment. In 1974 three observation wells were drilled near the wastewater treatment plant of Ganja in the vineyard where treated waters were used for irrigation in order to study pollution.

Ground waters have been located at depths of 20,35 to 21,92 m in those wells. Water samples taken from the well contained: phenol 0,007-0,13 mg/l oil products0,3-384,4, 960-1280 mg/l, sulfates, iron 0,5-

5,0 mg/l, biochemical oxygen demand 0,46-23,9 mg/l and so on, which are high(National Geological Exploration Services, MENR, eco.gov.az /.

Total mineralization of ground waters is 0,7-0,8 g/l and their composition contains sulfate hydro-carbonate, sodium-calcium. In most of other residential areas of the region because of the lack of waste water collection and treatment infrastructure wastewaters in those areas infiltrate the soil and then pollute ground waters .

Wide-scale works need further be carried out aiming at restoration and reconstruction of water supply and sewerage systems at cities and large settlements of pilot region to reduce impact on ground waters

3.5.2.2. Pollution with industrial pollutants

Pollution with industrial wastewaters mainly occur near Ganja and Dashkesan cities and also raion centers where are some small industries.Studies by stationary observation network of Geology Service of MENR show hat in the middle parts of Ganjachay cone (where fresh ground waters spread(and which is widely used for domestic services of people and irrigation), as well as in the impact zone of Ganja aluminum (present alumina) plant by drilled observation wells.

Pollution of ground waters hse been studied since 1974 along the side of the plant starting from its discharge areas and in 1000-3000 m distance from there . The aeration zone is rich in gravel and sands – i.e. rock with high permeability. Ground waters in discharge area lie down at 21-16m depth and their level gradually decrease in the last monitoring well (at the end of observation section) to 8,4m depth. Total mineralization of waters changes between 0,7-1,0 g/l and their chemical composition contains sulfate hydro-carbonate sodium-calcium. Amount of aluminum in water is periodically more than maximum allowable concentration (MAC), which is 0,05 mg/l, iron exceed MAC 3,5-50 times (MAC – 0,3 mg/l) and phenols 3-4 times (MAC – 0,002) . Amount of others pollutants (oil products, ammonia, nitrides, nitrates, especially sulfate ions) is also higher than their MAC 4 times(MENR, www.eco.gov.az).

It has to be mentioned that there is potential condition for pollution of ground waters with industrial wastes in Ganja, Dashkesan and other cities of Central Kura BD, where pollutants aren't covered by collection systems.

Potential pollution source of the plain zone ground waters with oil products can be considered area located near passing of Western Export oil pipeline which transport oil extracted from the Caspian Sea(collected from Sangachal terminal)..

3.5.2.3. Pollution with agricultural pollutants

Agricultural pollutants include intensive use of fertilizers and pesticides for many years (except for recent 5-6 years) in areas of irrigation farming in the Republic. In 1960-1985 fertilizers and pesticides were applied to the soil almost in a record amount every year, regardless of necessity. Despite of great assortment of mineral fertilizers, it was nitrogen (nitrates, nitrite and ammonium) compounds entered nitrogenous fertilizers which endangered ground waters. Those substances (compounds) are very persistent and well migrating in the underground hydrosphere. In relation with this, numerous diseases – mutagenic property, deformed (moron) birth of children (teragen feature), in other words, deterioration of the gene pool take place.

Phosphorous fertilizers are also considered toxic. However, movement (migration) of phosphorous fertilizers in the ground hydrosphere is limited by their high sorption and creating non-water-soluble compounds.

Potassium fertilizers and various microelements are used for yielding high agricultural harvest in the Republic, as well. But their danger to ground waters is comparatively smaller because of comparatively less use of those fertilizers and their better absorption by plants.

According to the results of studies critical environmental situation was recorded in samples taken from the centralized ground water supply facilities with various (50-150m) depths.

For example, amount of iron (mg/l) changes in wide-range in waters for centralized water abstraction facilities of Tovuz (0,3), (0,5), Goranboy (2,0) and Yevlakh (1,0) cities, oil products were 11-118 mg/l, nitrate 1,5-12,5 mg/l, etc.

Alongside with a number of factors, amount of a pollutant in ground waters depends on whether that pollutant is constant or casual, on the depth at which ground waters are located and sorption character of rocks in aeration zone, as well.

Pollution with cattle-breeding complexes – cattle-breeding, sheep-breeding, poultry-breeding, horse-breeding and somehow pig-breeding, especially cattle-breeding and sheep-breeding farms were developed in recent 30-40 years.

In connection with this, stables were built for farms in all administrative regions. As a result of studies it was observed migration of pollutants to ground waters depending on thickness of aeration zone in areas located farms in Karabakh plain which is next to Ganja- plain.

3.5.2.4. Pollution with flooding

Flooding processes are also widely spread in the Republic. Mining drilling, mining, bore-wells drilling and other works, as well as industrial, agricultural, other chemical wastes and technical substances being brought with floods can become direct or indirect potential pollution source for the surrounding environment and ground hydrosphere.

In October, 1997, it was recorded spilling of oil products to the surrounding environment at a gas-filling station because of flooding process took place in Goranboy and Yevlakh regions of Ganja- plain. It caused pollution of ground waters regardless of local character of the process.

3.5.2.5. Ground waters exploitation

It was mentioned that ground waters have been used in water supply of people by digging underground water-pipes since ancient times. Their capacity has usually been 5-20 l/s, while sometimes up to 30-70 l/s. Later, some of them were destroyed because of neglecting, digging of numerous exploitation bore-wells made some of them completely useless and caused decrease of consumption of others. Water supply of is partly met from Aghstafachay, Tovuz city and its villages from Akhinchay and Zayamchay, Shamkir from Shamkirchay, Ganja from Ganjachay and others through horizontal drainages from ground waters. Yield of those drainages is from 3-6 l/s to 50-60 l/s. Ground waters are mostly used scattered and line water withdrawal facilities –bore wells. Their total amount exceeded 2000 and their depths are 25-70 m, mostly 120-150 m, sometimes 300-400 m, while with pumps and gravity 50-70 l/s, mostly 5-30 l/s water is taken from wells. They are widely used for irrigation purposes.

Regional exploitation of fresh and weak mineralized ground waters was approved in the amount of 4075 thousand m^3/day for all water complexes.

Water resources were approved by State Resources Commissions in the amount of 200,8 thousand m^3/day in Ganjachay cone for water supply of Ganja, 232,8 thousand m^3/day for construction of , Tovuz, Shamkir, Khanlar, Goranboy and Ganja group water pipes, 17,3 thousand m^3/day for water supply of Shamkir and 2,5 thousand m^3/day in Jogashchay under-bed water resources for Dashsalahli bentonite clay quarry/71/.

Ground water exploitation is intensively carried out in Ganja- plain. Especially, the number of sub-artesian wells dug for irrigation increases year-by-year. This causes decrease of ground water level, water reduction in rivers and occurrence of negative situations in the ecosystem.

For example, intensive exploitation of ground waters (usually unconfined and I-II artesian aquifers) in Ganjachay cone reduced fast to 0,3-0,5m, sometimes 2,0 m per year in 1976-1985.

Ganja- plain area is bordered with the hydro-geological basin of Georgian Republic in the west. Production through scattered exploitation wells drilled in the west of the plain (Aghstafa and other regions) has no negative impact on ground water resources of the neighboring Republic. According to long-term information of the monitoring wells, ground water levels in this part of the plain have not undergone any serious changes. Annual level amplitude is 0,70-1,0 m at regime observation points, perennially, depth of ground water level almost remains stable herein. Water consumption in flowing observation wells that opened artesian aquifers has remained stable in perennial scale. Look on that.

3.6. Risk Assessment and Identification of Water Bodies at Risk

Methodology Used for Identification of Water Bodies at Risk

Water Body at Risk (WBR) is a water body that is identified as being at risk of failing the environmental quality objectives based upon the characterization as specified in article 5 of the WFD and results of operational monitoring as specified in article 8 of the WFD

During the Risk Assessment was conducted the identification of the water bodies “at risk” and/or “possibly at risk” that as one of the last steps in development of the River Basin Management Plan for the Central Kura BD

For the Risk Assessment, the first of all results from the Pressure and Impact Analysis were used. In the first step of the risk assessment for the river surface water bodies was using data from the national monitoring programme and mainly data from two JFS carried out under the EPIRB project. In case, when there was a lack of data *“Guidance Document addressing hydromorphology and physic-chemistry for a Pressure-Impact Analysis/Risk Assessment according to the EU WFD”* developed by the EPIRB project was used to estimate the risks for the water bodies. This approach was combined with the findings from direct field investigations and expert judgments. It is also to be mentioned that authors of this report are aware of the different quality of data used for the assessment. This fact give certain uncertainties, but would not effect the overall results of the risk assessment .

For the purpose of the Risk Assessment Report the so called **One-Out-All-Out principle**, to assign the final risk categories to the SWBs. It means that if given SWB was “at risk” for any of risk criteria used, it was ranked as SWB “at risk” even if other criteria were indicating SWB to be “not at risk”.

The category of rivers, water bodies "at risk" are those which are significantly affected by hydromorphological alterations and water pollution problems caused by the anthropogenic activities. The SWBs "possibly at risk" are those where not sufficient data are available to apply the risk criteria

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3.6.1. Identification of the surface water bodies into risk categories in the Central Kura BD

3.6.1.1. Risk Assessment of SWBs against Hydromporphological pressure Indicators

For identification of WBR against hydromorpholocial elements, 5 hydromporphological pressure type indicators have been used in accordance of the EPIRB project "Guidance Document on Pressure/Impact Analysis (Risk Assessment) (http://www.blacksea-riverbasins.net/)/

They include interruption of river continuity, hydrological alterations(water abstraction, impoundments, hydropeaking) and morphological alterations.

The risk assessment results which determine the assignment of river water bodies in the Central Kura BD within the risk group due to hydromorphological pressures are given in Annex 8 and Annex 9

Results of assessment show that 15 river water bodies can be characterized as WBR and 6 WBPR according to hydromorphological pressure.

As one can see from Figures 15 and 16 hydromorphological pressures lead to significant change of river bed and bottom. Ganjachay river section (11 km) within Ganja city because of construction of concrete walls in river banks should be characterized as HMWB.

Figure 15. The Qoshqarchay River with small camps around the river
(Photo by EPIRB project, 20013)

Figure 16. The Ganjachay River in Ganja city
(Photo by EPIRB project, 2013)

3.6.1.2 Risk Assessment of SWBs against Point and Diffuse Sources of Pollution

In the following part of the Risk Assessment report four indicators to analyze pressures from the pollution sources were applied. These sources of pollution are as follows:

- Two pressure indicators for pollution from municipal waste water sources (including industrial waste water sources as far as possible) and
- Two pressure indicators for diffuse agricultural pollution sources.

Where data from the national monitoring programme or from the JFS are available, they were used for the assessment. On the other hand, if data are not available the method described in the *"Guidance Document addressing hydromorphology and physic-chemistry for a Pressure-Impact Analysis/Risk Assessment according to the EU WFD"* were used to calculate these indicators.

As it was mentioned in the Pressure and Impact Analysis section in the Central Kura BD regarding the pollution of surface water, the main sources are the untreated waste waters from large cities and also small settlements may have certain impact on the water quality via direct discharge of the waste waters from the households to the rivers (upstream parts of the river basins). Due to fact that only aggregated data on the volume of untreated waste water are available it was necessary to make calculations in accordance with *Guidance Document* where, the ratio of untreated wastewater to annual minimum flow, showing river dilution capacity and, the ratio of total wastewater to annual average flow, showing total wastewater impact on the overall river basin. However, if data from the JFS and national monitoring programme on the water quality are available, they have been predominantly used (e.g. BOD, COD, nutrients, heavy metals).

Results from the risk assessment related to the point sources of pollution for the Central Kura BD are presented in Annex 10.

As mentioned in previous chapters agricultural activities can have significant impacts on the surface water bodies in the pilot river basin. Due to lack of data on the used fertilizers and pesticides for the given water bodies it was decided to use two pressure indicators in accordance with *Guidance Document*: the ratio of agriculture area in a given water body catchment to the catchment area of the respective water body and, the ratio of animal livestock unit to the catchment area of the respective water body. In this context, it is necessary to add that only aggregated data on the cattle (or livestock growing) are available for the economic region. Therefore, it was necessary to spread this data on the SWB area. It was decided that based on ratio of number of animals per ha will be assessed status of WBs according to risk criteria established in EPIRB project (if ratio is .1 then WBis considered to be at risk).

Results from the risk assessment related to both point and diffuse sources of pollution for the Central Kura BD are presented in Annex10 as well.

Results of assessment show that 14 river water bodies can be characterized to be at risk and 10 possibly at risk according to point and diffuse sources of pollution.

3.6.1.3 Summary of Risk Assessment Results for Surface Water Bodies

In this section is given summarized risk for surface water bodies according to:

- Risk Assessment of SWBs against Hydromporphological pressure Indicators by use of EPIRB project Guidance
- Risk Assessment of SWBs against Point and Diffuse Sources of Pollution by use of EPIRB project Guidance by use of EPIRB project Guidance
- Checking status of water bodies identified as to be at risk or possibly at risk by above 2 risk factors based on materials of JFS conducted by EPIRB project

Result of JFS confirmed existence of risk factors for majority of identified at risk and possibly at risk water bodies. But for some water bodies , which have been identified as possibly at risk (for example water bodies 1011-1-WB003 and 101-1-WB004 at Jogazchay river) according to point and diffuse source of pollution criteria used in the Guidance in opposite to this status of waters of these water bodies assessed (observed) during JFS was good. Therefore they have been addressed to water bodies not at risk.

By using ***One-Out-All-Out principle***, to river SWB was assigned one of three risk categories "not at risk", "possibly at risk" and "at risk". The results are summarized in Table 3 and shown in Figure 4. All together 15 SWBs were identified as "at risk" and 5 as "possibly at risk".

Table 23. Water bodies at risk in the category of rivers in the Central Kura RBD ("1" indicates a risk)

River Basin	HMWB	Risk factors			Number of WB	Length, Km
		Water flow regulations	Water abstraction for irrigation	Water quality problems: point pollution		
Aghstafachay	0	1	1	1	5	61.6
Tovuzchay	0	1	1	1	3	45.8
Qoshqarchay	0	0	1	1	1	89.9
Ganjachay	1	0	1	1	2	48.9
Zayamchay	0	0	1	1	1	29.2
Shamkirchay	0	0	1	1	3	43.8

3.6.1.4. Surface water bodies "at risk" in the Central Kura BD

As one can see from above assessment by use of Guidance document the category of rivers, water bodies "at risk" are those which are significantly affected by hydromorphological alterations and water pollution problems caused by the anthropogenic activities.

1) *Water abstraction for irrigation and domestic purposes at Ijevan and Dilijan cities in Armenian territory* ***based on reports of MENR of Azerbaijan Republic(www.eco.gov.az.)*** *has a significant impact on* ***the Agstafachay River section entering the Azeri territory flowing to Aghstafachay reservoir*** *(****10-1-WB001R).***
2) ***The Agstafachay River section from Agstafa reservoir to the confluence with the Joghazchay River (10-2-WB002R) is*** *significantly affected by the water flow regulations (Water regulation by sluices and dams is the main morphological alteration (CIS, Guidance Document #4). Downstream the dam of the Agstafa Reservoir the water flow (and water level) regime is regulated by the system of sluices) and water abstraction for irrigation.*
3) ***The Agstafachay River section from the confluence with Joghazchay River to Gazakh city (10-3-WB005R) is*** *a significantly affected by water abstraction for irrigation.*
4) ***The Aghstafachay River section near Gazakh city (10-4-WB006R)*** *is affected by water abstraction for irrigation and urban waste water discharge.*
5) ***The Agstafachay River section from the downstream of the Gazakh city to confluence with the Kura River (10-5-WB007R) is significantly affected by*** *of the water flow regulations and water abstraction for irrigation.*
6) ***The Tovuzchay River section from the Tovuzchay Reservoir to the confluence with the Asrikchay River (11-2-WB011R) is*** *significantly affected by the water flow regulations and the water abstraction for irrigation.*
7) ***The Tovuzchay River section after the confluence with the Asrikchay River to the river mouth (11-3-WB014R) is*** *significantly affected by water abstraction for irrigation.*
8) ***The Asrikchay River from the Asrik village to the confluence with the Tovuzchay River (112-2-WB013R) is*** *significantly affected by water abstraction for irrigation and the waste water discharge.*
9) ***The Zayamchay River section from the Titarli settlement to the confluence with the Shamkir Reservoir (20-3-WB024R) is*** *significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge.*
10) ***The Gadabeychay River section from the Gadabay city to the confluence with the Shamkirchay River (214-2-WB031R) is*** *significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge*
11) ***The Shamkirchay River section from the Mehrili settlement to the Yeniabad Vilage (21-5-WB035R) is*** *significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge.*
12) ***The Shamkirchay River section from the Yeniabad Vilage to the confluence with the Shamkir Reservoir (21-6-WB036R) is*** *significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge*
13) ***The Qoshqarchay River from the Hachaqaya settlement the confluence with the Kura River (12-2-WB038R,) is*** *significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge.*
14) ***The Ganjachay River from the Goygol city till upstream of Ganja city (13-3-WB42R)***
15) ***The Ganjachay River from downstream of Ganja city till Kura river (13-5-WB44R, 13-6-WB45R)*** *is significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge.*

River surface water bodies at risk are shown in Figure 17

3.6.1.5. Surface Water Bodies "possibly at risk" in the Central Kura BD

Water body possibly at risk to fail the EU WFD environmental objective is a water body for which information and data are not available in such extent to apply risk criteria, or there are visible hydromorphological alterations (i.e. barriers, impoundments, water abstraction, hydropeaking, etc.), but it is not possible to categorize the given water body into the risk categories. This group of water bodies is temporary, till the time when the additional data from the investigations are delivered for categorizing these water bodies to two categories (not at risk or at risk).

For the Central Kura BD, the following water bodies possibly at risk were identified:

- **The Tovuzchay river section** from place of entering to Azeri territory till Tovuzchay reservoir is affected by the water abstraction for the irrigation purposes and also waste water from the settlements and nutrients from the agricultural activities may have impact on the water quality.
- **The Akhinjachay river section from** from place of entering to Azeri territory till Tovuzchay reservoir is affected by the water abstraction for the irrigation purposes and also waste water from the settlements and nutrients from the agricultural activities may have impact on the water quality.
- **The Zayamchay river section from Yaniqli to Kohnagalo settlement**. Both water abstraction for the irrigation purposes and waste water from the several settlements can have an impact on the river water.
- **The Qoshkachay river section from the Bayan to Metalurgic factory**. In this part of the river water is abstracted for industrial purposes and also waste water from the factory is discharge directly to the river.
- **The Ganjachay river section from Topalhasanli settlement to Goygol city.** Water abstraction and waste water from the settlements may have an impact on the river water.

River surface water bodies possibly at risk are also shown in Figure 17

3.6.1.6 Artificial surface water bodies

As mentioned in Chapter 1. 6 artificial water vodies are identified in Central Kura BD:

10-1-AWB01- Shamkir canal (the right balk of Aghstafachay canal)

10-2-AWB02).-Salahli canal (the left bank of Aghstafachay canal

10-3-AWB03. - Kosalar canal

21-1-AWB04- Dallar canal

21-2-AWB05-Konullu canal

For all these canals there is need to conduct study to asses WBR for them according to WFD terminology

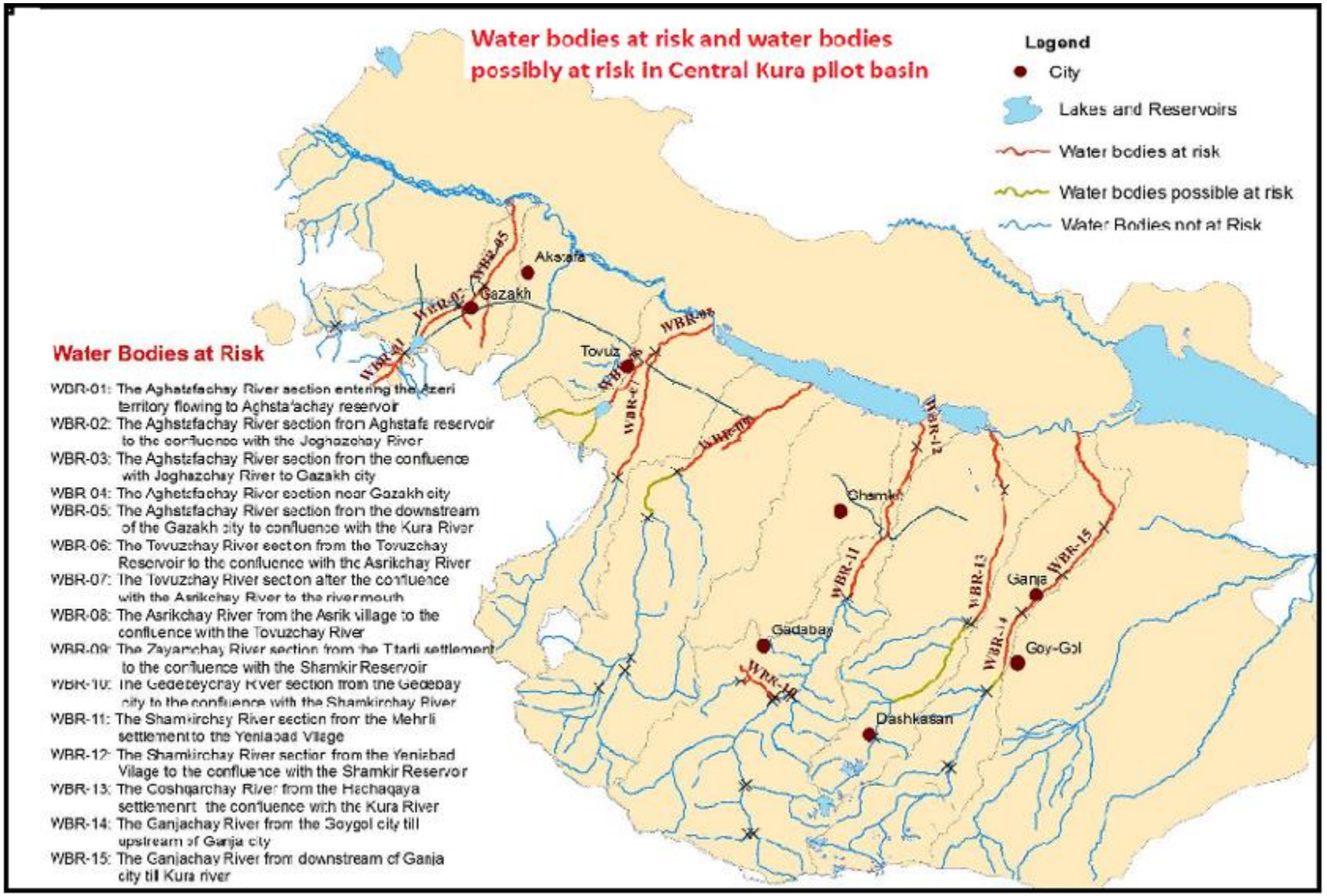
3.6.1.7. Identification of Heavily Modified Surface Water Bodies

In Chapter 2 is given identified in accordance with the EU WFD HMWB, which are designated as "a body of surface water which as a result of physical alterations by human activity is substantially changed in character" (CIS, Guidance Document #4).

Three water bodies (2 lakes WBs and 1 river WB) have been identified as heavily modified surface water bodies in the Central Kura pilot basin in Chapter 2. Below is given results of preliminarily assessment of WBR for these HMWBs:

- The Aghstafachay Reservoir, 10-1-HMWB01, was identified HMWB at risk due to significant hydromorphological changes by dam construction on the Aghstafachay River.
- The Tovuzchay Rezervoir, 11-1-HMWB02, was identified as HMWB possibly at risk due to significant hydromorphological changes by dam construction on the Tovuzchay river.
- The Ganjachay River reach near Ganja city, 11 km long, was identified as HMWB at risk. The Ganjachay River is channelled, and the banks of the river are reinforced by concrete dams of 4 meters height. These permanent and significant alterations of river morphology should lead the changes in the river ecosystem.
- Following the initial establishment of heavily modified surface water bodies, the final establishment will be conducted after analyzing the gaps to conduct the risk assessment for the surface water bodies. The final establishment will consist of verification of the validity of the criteria used to qualify a water body as a heavily modified surface water body. Map of HMWBs is also given in Figure 18.

Figure 17 . River surface water bodies at risk and possibly at risk



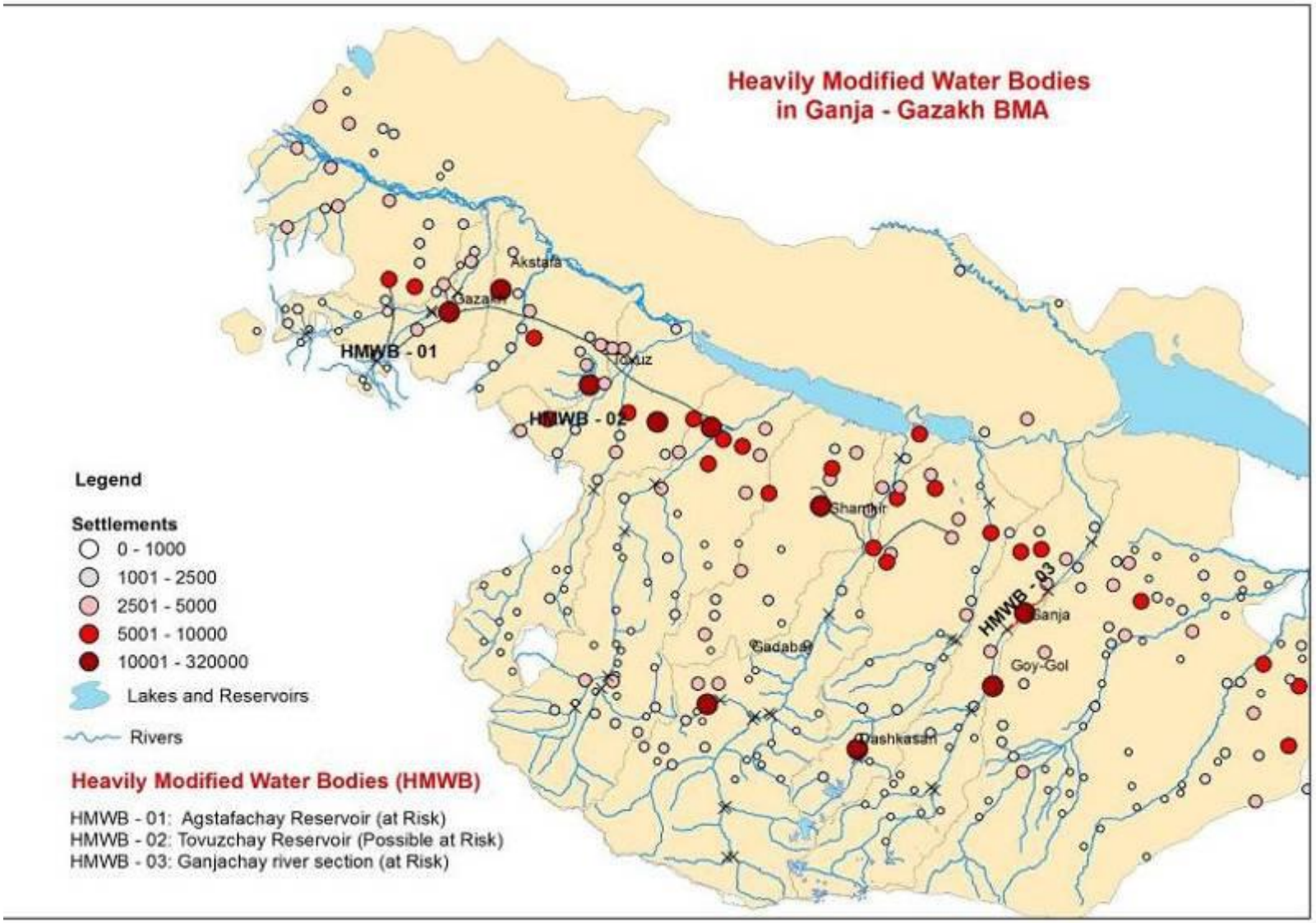


Figure 18 . Heavily modified Surface Water Bodies

3.6.1.8. Final list of delineated surface WBs

During the assessment of 48 delineated river SWBs, 2 SWBs at risk located in the same river segment have been merged in one water body at risk (13-5-WB44R and 13-6-WB45R on Ganjachay river). Therefore the total number of natural water bodies have been reduced from 48 to 44.

11 km long of the Ganjachay River reach near Ganja city, , identified as HMWB is also categorized as WBR because of significant hydromorphological alterations and also pollution pressure.

In addition to this heavily modified WB, Agstafachay water reservoir (10-1-HMWB01) has been categorized as WBR and Tovuzchay water reservoir(11-1-HMWB02) has been categorized as WB possibly at risk because of problems with water quality

The final list of all identified river and lake water bodies, including WBR and WBPR, as well as HMWBs and Artificial Water Bodies is given in Annex 6 (See also Figure 19 below).

3.6.2. Status of the Groundwater Bodies in the Central Kura Basin District

The WFD requires an initial characterization of groundwater bodies to assess their use and the degree to which they are at risk of failing to meet environmental objectives. Existing geological, hydrological, chemical, land-use, abstraction, discharge, and other data was used for the initial characterization. Groundwater body characterization helps to identify areas of similar hydrogeological conditions, and indicate whether the groundwater unit requires improvement measures in order to meet established management objectives.

Groundwater classification is based on the analysis of all above mentioned data which is available for wells and boreholes and also information on the anthropogenic influences, to establish the status of each groundwater body. Groundwater status includes both quantitative (the amount of groundwater) and chemical (quality of groundwater body) components. According to the WFD groundwater bodies are classified into 2 classes: good and poor.

Seven groundwater bodies have been identified and preliminary characterized and classified in the Central Kura pilot river basin district of the Republic of Azerbaijan. For identification and delineation of groundwater bodies WFD guidance documents were used as a methodological basis. Geological boundaries of the aquifers have been defined, their hydrodynamic differences and hydrochemical varieties evaluated. Fragmentation of aquifers into unmanageable numbers of water bodies has been considered and small groundwater bodies with similar characteristics were grouped. Groundwater bodies were given temporary codes and names.

All groundwater bodies, except of local aquifers in intrusive rocks, are used for drinking, agricultural and/or industrial water supply with the amount of more than 10 m^3/day. All groundwater bodies are of good chemical and quantitative status.

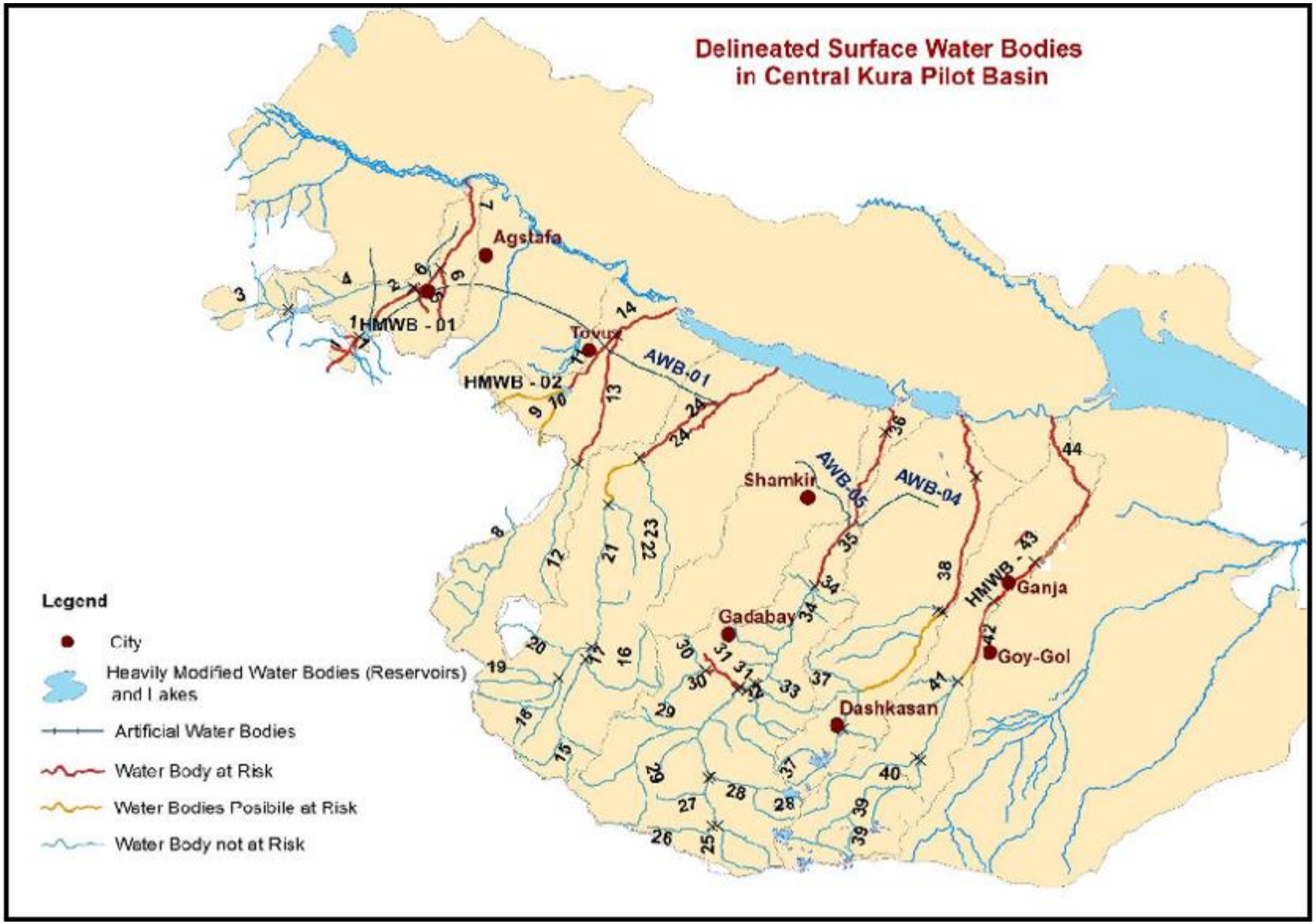
Conclusion

Based on the available data and information (JFS 1 and 2 and national monitoring programme) and using the methodology described in the "Guidance Document addressing hydromorphology and physico-chemistry for a Pressure-Impact Analysis/Risk Assessment according to the EU WFD" developed by the EPIRB project following can be concluded:

- 15 Surface water bodies were identified as "at risk";
- 5 surface water bodies identified as «possibly at risk";
- 3 water bodies (2 lakes WBs and 1 river WB) have been identified as heavily modified surface water bodies;
- 5 water bodies identified as AWBs;

Regarding the groundwater bodies all of them were identified as "not at risk".

Figure 19. Delineated Surface water bodies in Central Kura pilot basin



4. MONITORING PROGRAMME for SWB and GWBs IN THE CENTRAL KURA BD

4.1. Monitoring programme of SWBs

4.1.1. Introduction

The two key environmental objectives of the Water Framework Directive (Directive 2000/60/EC; WFD) for surface waters are:

- *to prevent deterioration of the status of all bodies of surface water;*
- *achieving good surface water status.*

The status of surface waters is determined by both its *ecological* status and its *chemical* status.

The structure and content of this monitoring programme represents the outcome of the activities conducted under the EPIRB Project as part of the River Basin Management Plans pilot for the Central Kura River basin.

The monitoring programme outlined here is designed to meet the stated requirements of the WFD and related CIS Guidance Documents. The WFD sets out three types of monitoring programmes: surveillance, operational and investigative. These programmes will be explained further in the sections below.

In the process of monitoring programme development the data and information from the JFS-I, JFS-II and national monitoring programmes conducted in the Central Kura River basin were used. Furthermore, the Typology Report, the Pressure – Impact Analysis and Risk Assessment Reports were used as basic documents in selecting the sampling locations for the Operational Monitoring.

4.1.2. Surveillance Monitoring Programme of Surface Waters

4.1.2.1. Sampling locations

The selection of sampling locations and the design of the SM programme is based on sub-networks each related to fulfil one or more of the main objectives of SM as presented above. The sub-networks of the SM programme for rivers and lakes include the following ones:

- SM1: to be representative of the overall surface water status;
- SM2: detection of long-term trends (the assessment of long-term changes in natural conditions and the assessment of long-term changes resulting from the anthropogenic activities);
- SM3: supplementing and validating risk assessments;
- SM4: Large rivers and significant cross border river and lakes water bodies.

The sampling locations for the SM Programme of the Central Kura River basin are summarized in the Table 24.

Table 24. Surveillance Monitoring sampling locations in the Central Kura River basin (rivers)

No.	*River name*	*Character of WB*	*Expected status/potential*	*Location name*	*Risk category*	*SM sub-network*
1	Jogazchay	NWB	RC I	Alpoud	NR	SM4
2	Akhinjachay	NWB	RC I	Qaralar	NR	SM2
3	Ganjachay	NWB	RC II	Zurnabad	NR	SM1
4	Qoshkachay	NWB	RC III	Khoshbulaq	NR	SM2
5	Zayamchay	NWB	RC IV	Yaniqli	PR	SM1
6	Akhinjachay	NWB	Moderate	Upper Tovuz	PR	SM4
7	Tovuzchay	NWB	Moderate	Oysuzlu	PR	SM4
8	Agstafachay	NWB	Moderate	Below reservoir	PR	SM4
9	Shamkirchay	NWB	Poor	Below highway bridge	R	SM1

NWB means Natural Water Body

Table 25. Surveillance Monitoring sampling locations in the Central Kura River basin (lakes)

No.	*Lake name*	*Character of WB*	*Expected status/potential*	*Location name*	*Risk category*	*SM sub-network*
1	Lake Zincirli	HMWB	High	shore and close to dam	NR	SM2

All together 10 sampling locations (9 on the rivers and one on lake) were identified to be monitored under the SM programme for the Central Kura River basin.

The sampling locations for the SM programme of the Central Kura River basin are shown on the Figure 20 and detailed information is presented in EPİRB project Web page(http://www.blacksea-riverbasins.net/)

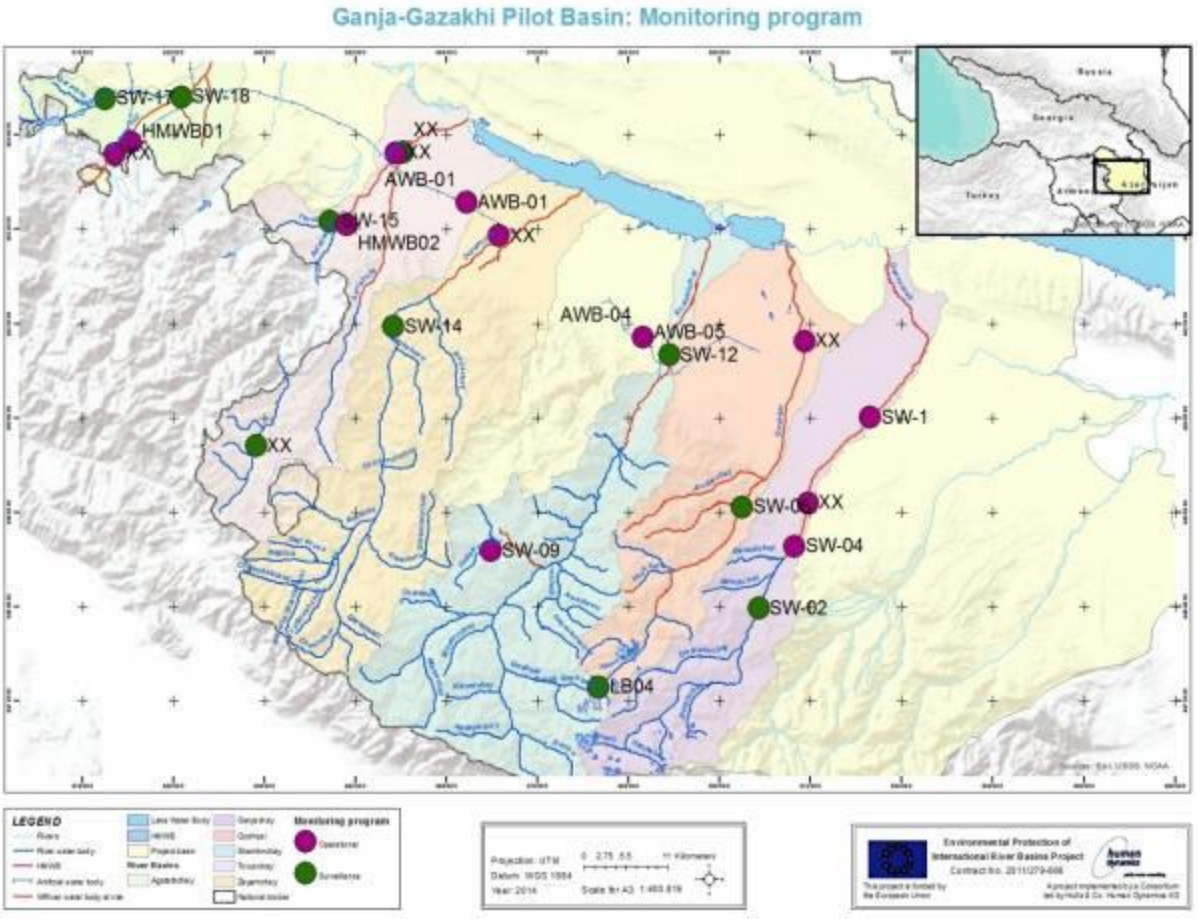


Figure 20. Sampling locations for the SW Monitoring Programme in the Central Kura pilot river basin (AZ). (Note: This map is the first draft the final one will be developed after comments from the national team and based on the coordinates assigned to the sampling locations by the national experts).

4.1.2.2 Quality Elements

According to WFD Annex V.1.3.1, a Surveillance Monitoring Programme shall be performed at each selected surveillance monitoring location for a period covered by a RBMP for (see Table 26 and 27):

- parameters indicative of all biological quality elements;
- parameters indicative of all hydromorphological quality elements;
- parameters indicative of all general physico-chemical quality elements;
- priority list pollutants which are discharged into the river basin or sub-basin;
- other pollutants discharged in significant quantities in the river basin or sub-basin (pilot river basin specific pollutants).

4.1.3 Operational Monitoring of Surface Waters

4.1.3.1 Background

The Operational monitoring (OM) Programme is focused on monitoring the effect of supporting measures aimed at achieving the objectives of the WFD in the water bodies (possibly) at risk. It is designed to provide targeted information on the effectiveness of specific measures taken within the Central Kura River basin.

The objectives of OM programme are defined as follows:

- to establish the status of those bodies identified as being at risk of failing to meet their environmental objectives;
- to assess any changes in the status of such bodies resulting from the programmes of measures.

Because the protection of high and good status from deterioration is required by the WFD, OM programme must also provide information on whether the POMs, aimed at maintaining such status, are effective. Therefore, even water bodies that are not categorized to be at risk in the Risk Assessment Report prepared are included in the OM programme because measures are required to maintain them at their current high or good status regardless of existing risk category.

Risk Assessment Analysis has identified 10 water bodies "at risk" and 4 ones "possible at risk" in the Central Kura River basin. These results were transferred into the OM programme.

4.1.3.2 Sampling locations

Sampling locations for OM programme are assigned to one or more sub-networks each related to fulfil one or more of the main objectives of the OM programme.

The sub-networks of the OM programme for rivers and lakes include the following ones:

- OM1: to assess the effect of measures that have been aimed at improving the impact of individual and combined point sources (organic pollution, eutrophication impacts and priority substances);
- OM2: to assess effectiveness of the measures related to diffuse pollution sources;
- OM3: To assess effectiveness of measures to reduce hydromorphological alterations;
- OM4: To monitor high and good status sites currently not categorized to be at risk in order to assess the effectiveness of POMs aimed at maintaining high and good status water bodies;
- OM5: to monitor protected areas which are at risk.

Note: Several water bodies with the same type were identified to be "at risk" due to the same pressure type (water abstraction and point sources of pollution). Therefore, some of sampling locations for the OM programme were selected to be representative for the group of water bodies.

All together 12 sampling locations for rivers and 2 for lakes were identified to be monitored under the OM for the Central Kura River basin and results are summarized in the Table 26 and 27. Seven sampling locations are in the WBs, four of the sampling locations are situated in the AWBs (irrigation canals) and three in the HMWBs.

Table 26. Operational Monitoring sampling locations in the Central Kura River basin (rivers)

No.	*River name*	*Character of WB*	*Expected status/potential*	*Location name*	*Risk category*	*OM sub-network*
1	Ganjachay	NWB	Good	Topalhasanli	PR	OM4
2	Agstafachay	NWB	Poor	Mollarjafirli	R	OM3
3	Tovuzchay	NWB	Poor	Alimardanli	R	OM1

4	Zayamchay	NWB	Moderate	Kohnagala	R	OM3
5	Qoshkachay	NWB	Bad	Met-factory	R	OM1
6	Gedebedchay	NWB	Bad	Gedebed	R	OM1
7	Ganjachay	NWB	Poor	Below Goygol City	R	OM3
8	Ganjachay	HMWB	Bad	Below Ganja City	R	OM3
9	Shamkir main canal	AWB*	Poor	to be selected	R	OM3
10	Shamkir main canal	AWB*	Poor	to be selected	R	OM3
11	Dallar canal	AWB*	Poor	to be selected	R	OM3
12	Konullu canal	AWB*	Poor	to be selected	R	OM3

* *AWB – Artificial Water Body*

In case of the lakes, 2 sampling locations were selected to be monitored under the OM Programme (see Table 27).

Table 27. Operational Monitoring sampling locations in the Central Kura River basin (lakes)

No.	***River name***	***Character of WB***	***Expected status/potential***	***Location name***	***Risk category***	***OM sub-network***
1	Aghstafachay reservoir	HMWB	Moderate	shore and close to dam	R	OM3
2	Tovuzchay reservoir	HMWB	Moderate	shore and close to dam	R	OM3

The sampling locations for the OM programme of the Central Kura River basin are shown on the Figure 1 and detailed information is presented in EPIRB project Web page(http://www.blacksea-riverbasins.net/)

4.1.3.3. Quality Elements

In order to assess the magnitude of the pressure to which the surface water bodies are exposed in the Central Kura River basin those quality elements are monitored that are indicative of the identified pressures. The following quality elements will be monitored as relevant :

- parameters indicative of the biological quality elements, most sensitive to the pressures to which the water bodies are subject;
- all other specific pollutants discharged in significant quantities into the river basin or sub-basin;
- parameters indicative of the hydromorphological quality elements most sensitive to the pressure identified.

4.1.4 Investigative monitoring

The WFD includes a third type of monitoring called Investigative Monitoring (IM). The WFD states that this type of monitoring is required for situations when the surface water body is at risk with a very specific manner that causes of water bodies failing to achieve the required environmental objectives under the WFD. The list of parameters in this case will be dynamic and its validity in time should be limited, in order to respond to new information on the potential risks posed by emerging pollutants and any others alterations. However, it is not expected to conduct the IM in the Central Kura River basin in this stage of the monitoring programme.

The results of the Joint Field Surveys indicate that at some locations there might be a risk of failing to meet WFD's criteria for good chemical status (refer to Chapter 5 for more details).

The JFS-I and/or JFS-II results instigate additional sampling and analysis for verification/falsification of the *cadmium* concentrations measured at the following JFS I/II sites

- Gushchyçay River, Gushchu village
- Jogazchay River, Alpout village (Gazakh)
- Qoşqarçay River, Khoshbulag village
- Tovuzchay River, Oysüzlü village

Furthermore, the *lead* concentrations in the Qoşqarçay River at the locations "Khoshbulag village" and "Met-factory" instigate further investigations.

It is recommended to repeat the additional sampling and analysis at least three times, with minimally monthly intervals, during the spring and summer of the year 2015.

In case the additional samples confirm the JFS-I/II (potential) exceedance of the relevant environmental quality standards at one or more sites, then SM3 surveillance monitoring (supplementing and validating risk assessments) should ensue, in combination with an inventory of potential anthropogenic sources.

4.1.5 Frequency of monitoring programme

Sample frequency will vary depending on the monitoring programme and the individual sub-networks and the quality element.

Long-term trend monitoring locations will require high frequency sampling. The sites required for supplementing and validating the risk assessment will be monitored with different frequencies depending on the importance of the risk, details of the frequency of monitoring required for each of the individual river sub-networks are given in EPIRB Project Web page(http://www.blacksea-riverbasins.net/)

4.1.6 Quality Control and Quality Assurance

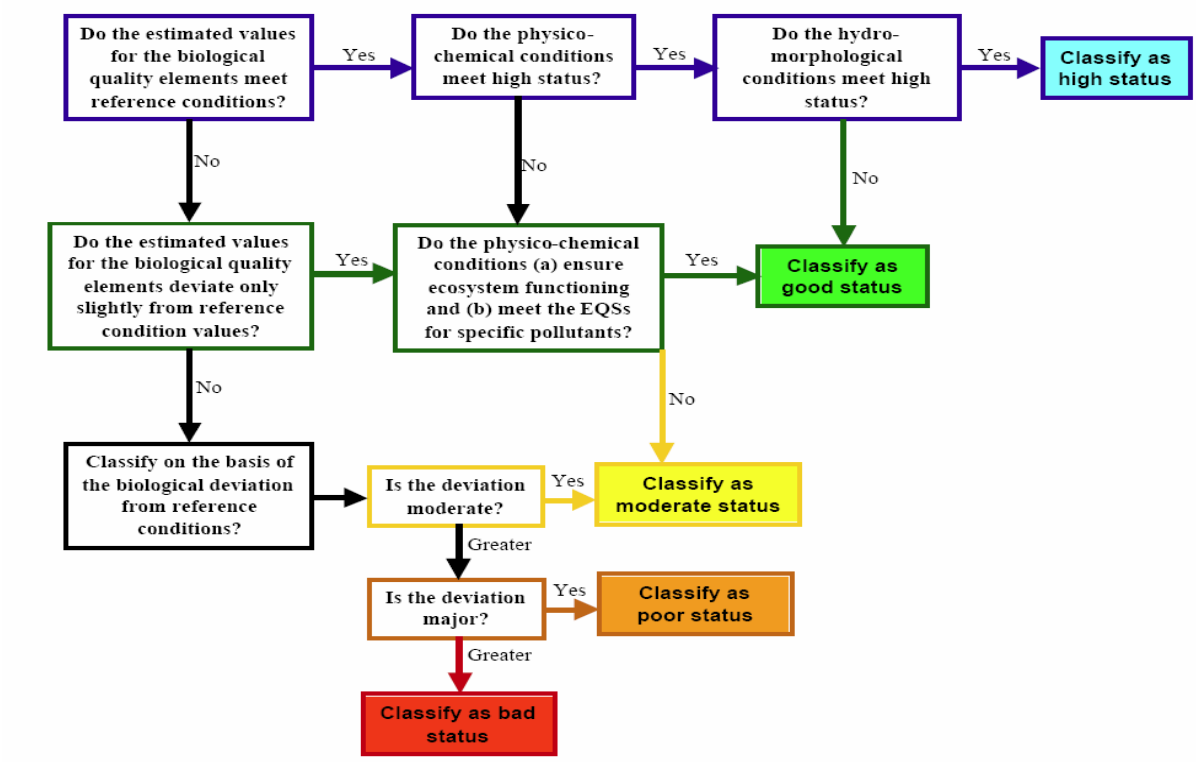
It is important for the surface water monitoring programme to ensure that data generated by WFD physico-chemical and biological monitoring parts are reliable and representative. Furthermore, as it is known a data should allow the assessment of the impacts of Programs of Measures on the water body status. Therefore, Quality Management Programme should be prepared for all steps of the monitoring programme from sampling via analysis to the data management and interpretation. It is expected that sampling and analysis (physico-chemical and biological quality elements) will be conducted in accordance with ISO Standards (other International Standards) and laboratories will meet the requirements of the ISO 17025 Standard.

4.1.7 Ecological Status Assessment

The WFD defines ecological status in the high, good and moderate classes for each of the ecological quality element for each of the surface water categories. It describes the biological and hydromorphological

parameters and the physico-chemical and relevant pollutants required in the overall ecological assessment. Web page(EPIRB project ,http://www.blacksea-riverbasins.net/) .

The overall ecological status assessment is shown on the scheme below.



All biological quality elements must be taken into account when assigning water bodies to any of the ecological status or ecological potential classes. For each biological element the set of the metrics (or indices) will be selected to be indicative for the given pressures. The status of each of the biological elements for natural water bodies is determined by measuring the extent of the deviation, if any, of the observed condition from the **reference condition** established for that type of water body. Reference conditions are the conditions established for the biological elements in the absence of pollution or disturbance (or at least minimum disturbance).

Ecological status assessment system will be expressed numerically as *ecological quality ratios* (EQR) in the range between 1 (high status) and 0 (bad status). The EQR scale for the assessment system for each surface water category is divided into the five classes by assigning a numerical value to each of the boundaries between the classes.

The physico-chemical and hydromorphological quality elements are supporting elements of the biological assessment for the purpose of the overall ecological status assessment. Therefore, based on the existing data from the JFS and national monitoring programmes statistical analysis will be conducted to express numerically boundary for the classes.

4.1.8 Chemical Status Assessment

The chemical status of surface water bodies is linked with the WFD Annex X pollutants. The latest EU directive specifying both the pollutants ('*Priority substances and certain other pollutants'*) and their environmental quality standards (EQS), is the Directive 2013/39/EU "*amending Directives 2000/60/EC and 2008/105/EC as regards Priority substances in the field of water policy*".

The Directive 2013/39/EU has defined EQSs for in total 45 (groups of) substances, comprising four metals (cadmium, lead, mercury and nickel) and a wide array of organic micropollutants.

In principle, two (complementary) environmental quality standards are defined; both EQSs are to be met in order to qualify as 'good chemical status':

- annual average – environmental quality standard (AA-EQS), applying to the arithmetic mean of one year of data, with monthly sampling presumed;
- maximum concentration – environmental quality standard (MAC-EQS), applying to the maximum concentration in the annual set of data.

4.2 Programm of Monitoring for GWBs

4.2.1 Existing Groundwater Monitoring network

Complex Hydrogeological Expedition, Ministry of Ecology and Natural Resources, Republic of Azerbaijan declares availability of 52 monitoring wells in the Central Kura pilot basin, of them 27 are installed into shallow (unconfined) aquifers and 25 monitoring wells are drilled into artesian groundwater bodies (figure 22). Twelve artesian monitoring wells are flowing. JFS in 2013 revealed that quite many of existing monitoring wells are destroyed or clogged. Therefore, inventory of monitoring network is needed to find out how many of former monitoring wells exist in reality and can be used for further groundwater monitoring.

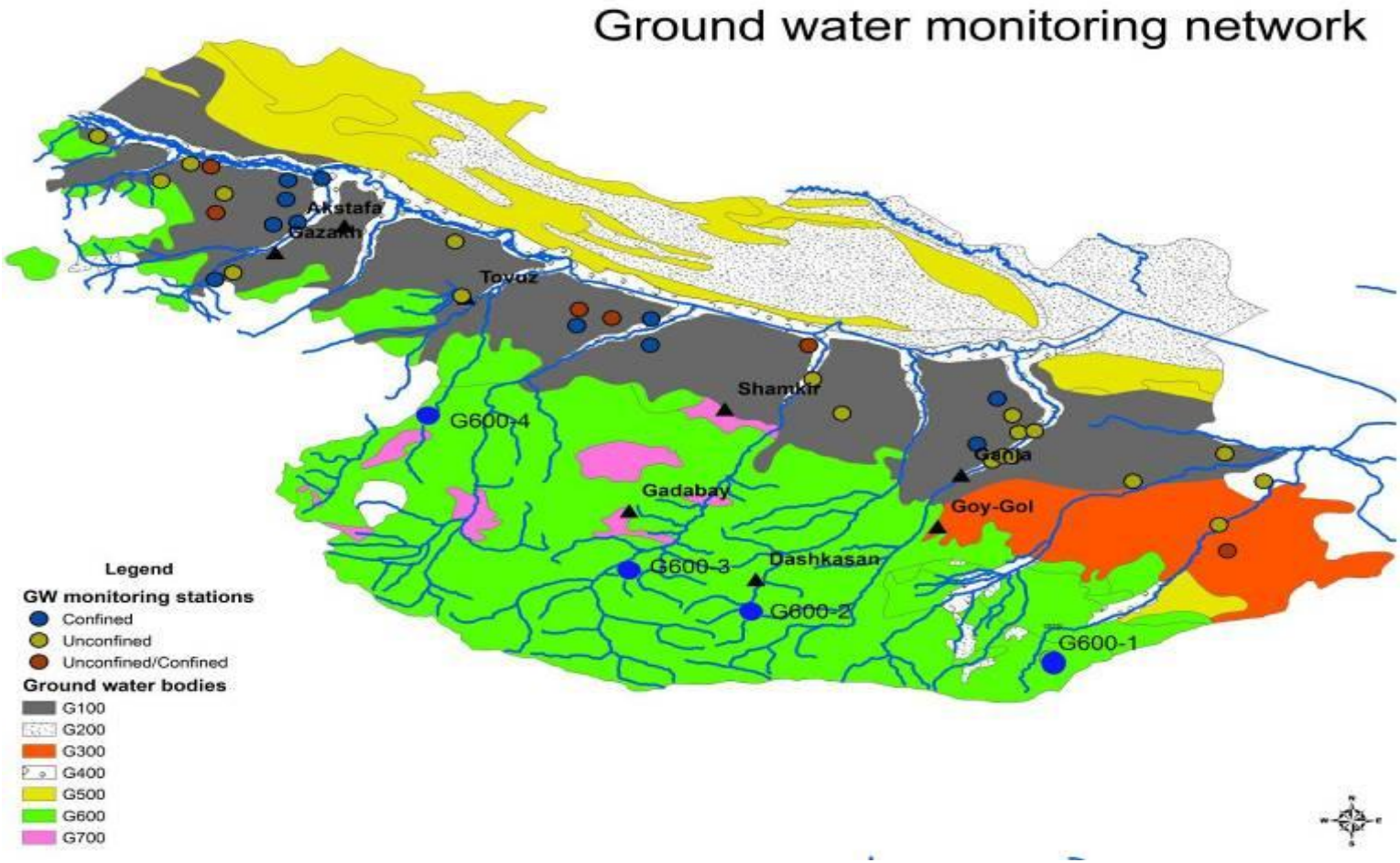


Figure 22.. Existing groundwater monitoring stations and additionally proposed monitoring springs (G600-1-G600-4) in the Central Kura pilot basin (Source: EPIRB project 2014)

4.2.2 Proposed monitoring programme

Groundwater monitoring programme in the Central Kura pilot basin shall formally consist of surveillance, operational, drinking water protection areas and prevent and limit monitoring. Monitoring shall be concentrated in the groundwater bodies mostly used for drinking water supply: G100, G300 and G400. Complex Hydrogeological Expedition, Ministry of Ecology and Natural Resources, Republic of Azerbaijan shall be responsible for surveillance monitoring, water supply companies and potential polluters shall perform operational, drinking water protection areas and prevent & limit monitoring.

4.2.3 Quantitative monitoring

The quantitative monitoring means observation of long-term water level trends and assessment of saline or other intrusions caused by groundwater abstraction. Groundwater level monitoring stations shall be located across a groundwater body to achieve a good spatial cover of information within groundwater body recharge and discharge areas.

Groundwater level and flow measurements shall be carried out in:

- Monitoring boreholes (surveillance monitoring) or production wells (operational monitoring);
- Natural springs;
- Surface water courses during drought periods (Ganja, Shamkir, Tovuz, Agstafa rivers);

The installation of electronic data loggers is recommended in all quantitative groundwater monitoring boreholes because continuous data recording allows to better understanding aquifer's response to changes of natural regimes and pressures/abstraction events.

Until electronic data loggers are installed groundwater levels shall be measured by the local observers 3 times/month and during the sampling events, 2/4 times/year.

4.2.4. Surveillance monitoring

Existing monitoring network (52 boreholes) will be sufficient for the quantitative and surveillance monitoring if all monitoring wells are working properly. Inventory of the network is needed before the establishment of the WFD compliant monitoring programmes.

Chemical parameters, such as pH, temperature, dissolved oxygen, electric conductivity; total dissolved solids, etc. have to be measured in the field at the well. Monitoring wells must be properly purged before collecting groundwater samples.

The Complex Hydrogeological Expedition according to annually approved plans shall conduct surveillance (national) monitoring of groundwater. General chemical parameters (main cations and anions, nutrients) which characterize groundwater chemical status and quality formed under the natural conditions and anthropogenic impacts shall be analyzed in groundwater samples at least two times a year.

Specific chemical components, like organic compounds and pesticides, with usually very low concentrations shall be monitored once in six years, and trace elements shall monitored once in a two year period in wells where these components are likely to be detected. If budget for groundwater monitoring is not sufficient annual rotation of sampling wells may be recommended.

The following groundwater monitoring frequency (for surveillance and quantitative monitoring) is proposed for the Central Kura pilot basin:

Table 28. Groundwater monitoring parameters and frequency

Parameters and indices	**Frequency, at least**
Main anions and cations (Na, K, Ca, Mg, Fe^{tot}, NH_4, HCO_3, Cl, SO_4, NO_3, NO_2) and physical properties (pH, specific conductivity, permanganate index, or TOC)	2-4 times a year
Trace elements (Fe, As, Hg, Cd, Pb, Zn, Cu, Cr, etc.)	Once per 2 years
Pesticides*	Once per six years
Polycyclic aromatic hydrocarbons, Phenols, Trichloroethylene, Tetrachlorethylene**	Once per 2 years
Groundwater levels in monitoring wells, boreholes and flow of natural springs	Electronic data loggers – every 6-12 hrs. Other monitoring wells 3 times/month. Springs- during the sampling events (2-4 times/year)

Notes: * pesticides have to be analyzed only in monitoring points located in the agricultural areas

** PAH, phenols, TCE&PCE have to be analyzed in the wells located in urban territories (Ganja, Tovuz, etc.) and near the industrial sites.

Proposed quantitative and surveillance groundwater monitoring network is presented in the figure 22. and table 29.

Table 29. Proposed surveillance groundwater monitoring network

No/ No	Name and code of GWB	No of monitoring well	What is monitored	Purpose of monitoring
1	Unconfined Quaternary GWB (G100, G300, G400)	27 unconfined monitoring wells officially numbered by the Complex Hydrogeological Expedition	Level, temperature and chemistry	GW recharge-discharge areas. Boreholes in Agstafa district will be used for transboundary monitoring with Georgia
2	Artesian Quaternary GWB (G100, G300, G400)	25 artesian monitoring wells officially numbered by the Complex Hydrogeological Expedition	Level, temperature and chemistry	GW recharge-discharge areas. Boreholes in Agstafa district will be used for transboundary monitoring with Georgia
3	Jurassic-Cretaceous	4 springs (G600-1-G600-4)	Discharge,	GW recharge-discharge areas

	GWB (G600)	for groundwater quality	temperature and chemistry	
	Totally:	56 monitoring stations		

4.2.5. Operational monitoring

There are no GWB at risk in the Central Kura pilot basin therefore only quantitative and surveillance monitoring are planned on a national scale. Groundwater directive recommends establishment of threshold values for the chemical components making groundwater body at risk of not achieving WFD environmental objectives, but this task is not important for the groundwater bodies of Central Kura basin.

In order to observe impact of groundwater abstraction it is recommended that water users perform groundwater monitoring in their abstraction points (well fields). The WFD Art. 7 recommends to monitor well fields abstracting >100 m^3/day. Abandoned abstraction wells may be used for groundwater monitoring.

4.2.6 Other monitoring types

Monitoring of drinking water protection areas and prevent & limit monitoring shall be performed by the groundwater supply companies and potential polluters. Changes in legislation shall be foreseen in order to oblige water users to monitor impact of abstraction on groundwater bodies and polluters to perform prevent and limit monitoring.

5. ENVIRONMENTAL OBJECTIVES

5.1 Environmental Objectives in Accordance with EU WFD

The environmental objectives are proposed to be set based on the WFD Article 4 and by using the EPIRB Project Guidance Document on the Development of Program of Measures and the Achievement of Environmental Objectives

According to the EU WFD for (i) setting of environmental objectives and (ii) the development of WFD compliant Programmes of Measures the guidance document developed by EPIRB project was used. It supposes to design the PoMs in such a way that they correspond to the results of the Pressure/Impact Analysis and risk assessments as well as it shall include measures to fill identified gaps that currently hinder complete WFD compliant implementation/80/.

Setting environmental objectives aim to determine the specific water status - for both surface waters and groundwater – that has to be achieved within one of the WFD planning cycles.

Environmental measures need to be set in such a way that they ensure a balance between maintenance and improvement of water resources also ensuring their sustainable use.

Therefore, the six-year planning cycles of the EU WFD are crucial when it comes to setting EU WFD environmental objectives basically determining the implementation time line of measures towards good status for all water bodies.

For EU Member States the first planning cycle relates to 2009 and, hence, the first RBMPs. The second cycle ends 2015, the third one in 2021 and the last one in 2027 when all environmental objectives have to be achieved.

According to Guidance Document (give cross reference) the first cycle is proposed to start by the end of 2015 when the RBMPs are due to be compiled.

The EU WFD allows for stepwise approaches over the planning cycles to achieve environmental objectives. Such approaches need to make use of exemptions according to EU WFD Article 4 and need to be presented in the RBMPs in a fully transparent way.

Setting environmental objectives and planning their achievement are the basis to design appropriate measures as part of the Programme of Measures.

Setting environmental objectives for surface waters and groundwater takes an important role within river basin management planning. Environmental objectives aim at:

- Achieving good status for all water bodies;
- Prevent deterioration of water status;
- Ensure sustainable water management;
- Meet specific requirements for protected areas.

For water bodies in high status environmental objectives aim for measures that maintain water status.

Water bodies that are in moderate or worse status shall be addressed with measures that allow an achievement of the following environmental objectives

- *good ecological/chemical status* of surface water bodies;
- *good ecological potential* and *chemical status* of HMWBs and AWBs;

- *good chemical/quantitative status* of groundwater bodies.

5.2. Exemptions according to WFD

According to its Article 4 the EU WFD allows to set exemptions that explain why the good ecological/chemical/quantitative status or the good potential of water bodies cannot be achieved within the first planning cycle but only later or not at all. When setting environmental objectives the requirements related to exemptions need to be taken into account

In summary, WFD Article 4(4) on exemptions outlines conditions that have to be met if respective measures that are needed to achieve the set environmental objectives will not be implemented in the first WFD planning cycle but in later ones . For EU Member States this means that measures to achieve objectives will not be implemented by 2015, but either by 2021 or 2027 at the latest.

This be small-scale temporary or mid to long-term deviations from the rule of achieving of a "good status" by the end of WFD river basin planning cycle and include the following:

- the extension of the deadline, in other words, good status must be achieved by 2021 or 2027 at the latest (Article 4.4) or as soon as natural conditions permit after 2027;
- the achievement of less stringent objectives under certain conditions (Article 4.5);
- the temporary deterioration of the status in case of natural causes or "force majeure" (Article 4.6);
- new modifications to the physical characteristics of a surface water body or alterations to the level of bodies of groundwater, or failure to prevent status deterioration of a body of surface water (including from high status to good status) as a result of new sustainable human development activities (Article 4.7).

In case, *less stringent environmental objectives* are aimed for in water bodies implementers need to fulfill the requirements of WFD Article 4(5).

In case of Central Kura pilot river basin, the exemption may be applied to identified HMWBs(including newly constructed Shamkirchay and Tovuzchay reservoirs) change of status will be not feasible according to above reasons.

Also it can be related to transboundary rivers (Tovuzchay and Agstafachay) the management of quality and quantity in upstream of which isn't depend from Azerbaijan.

In parallel with these exemptions there should be to be applied to the planned water reservoirs on Zayamchay and Ganjachay rivers.

5.3. Setting of environmental objectives for WBs in Central Kura Basin District

Set environmental objectives refer to the timeline of the six-year WFD planning cycles.

Depending the redness of the country to start concrete practical work to improve status of WBs this process may not happen in 2021 but it is for sure that by 2027 this process will be effective. Therefore in below objectives implementation of supplementary measures to ensure WFD compliance will be planned by 2021 but PoM to improve of water body status depending on circumstances may help to reach objectives by 2021(if

relevant steps will be taken during 2015-2021) or in second planning circle(2027). Therefore some adjustments are made to the Table of EPIRB project guidance(see below Table 30).

Table 30: Environmental objectives according to status of water for six year planning cycles for the EPIRB Project.

	Water Status 2015	**Environmental Objectives**
	1	2
1	Water bodies in **high or good status in 2015**	1..Need the setting of environmental objectives and 1.1. measures that maintain water status over all six- year planning cycles up to 2033 and beyond.
2	Water bodies that are (i) **at risk to fail the environmental objectives in 2015** or (ii) in **moderate status in 2015**	2..Need the setting of environmental objectives **within the first planning cycle (= by 2021):** 2.1.(i) to **have WFD compliant status assessment in place by 2021** and 2.2.(ii) to achieve **good status by 2027** **or** 2.3.Identify exemptions
3	Water bodies that are (i) **at risk to fail the environmental objectives in 2015** or (ii) in **poor status in 2015**	3.Need the setting of environmental objectives**:** 3.1. (i) to **have WFD compliant status assessment in place within the first planning cycle (= by 2021)** 3.2. (ii) to achieve moderate status by **2027, good status by 2033** **or** 3.3 Identify exemptions
	Water bodies that are (i) **at risk to fail the environmental objectives in 2015** or (ii) in **bad status in 2015**	4. Need the setting of environmental objectives**:** 4.1. (i) to **have WFD compliant status assessment in place within the first planning cycle (= by 2021)** and 4.2.(ii) to achieve poor status by 2027, **moderate status by 2033 and** Good status by 2039 **or** 4.3.Identify exemptions

As there is no water status assessment and classification system in Azerbaijan therefore it is proposed that during 2016-2021 there will be need to set them and make operational in pilot river basin. This will allow to assess ecological status of all water bodies in pilot region.

Depending on the ecological status of WBR or WBPR by use of above table are identified environmental objectives and given in Annexes 6 and 7 accordingly .

6. PROGRAM OF MEASURES

6.1. Methodology to develop Programs of measures

The RBM planning includes the development of a Programme of Measures (PoM), which is a heart piece of RBMPs and follow the pressures/impact analysis, risk assessment and water status assessment through monitoring.

PoMs serve the key purpose to reach the EU WFD objectives in particular *good water status* and, hence, provide regulatory actions to reach, maintain and/or improve water status.

Requirements regarding Programme of Measures are part of the EU WFD Article 11 stating that '*each Member State shall ensure the establishment for each river basin district, or for the part of an international river basin district within its territory, of a programme of measures, taking account of the results of the analyses required under Article 5, in order to achieve the objectives established under Article 4.*

Article 11 sets out the types of measures to be part of PoMs to ensure the achievement of the WFD environmental objectives. These types – that are:

1. Basic measures and, if needed,
2. Supplementary measures.

6.1.1.Basic Measures

EPIRB project Draft Guidance Document on the Development of Programme of Measures and the Achievement of Environmental Objectives According to the EU WFD. recommends the implementation of measures regarding the Directives marked in red (See Figure 23) during ***the first two planning cycles***. Measures regarding the other EU Directives should be implemented in the following planning cycles.

Figure 23: EU Directives relevant to be addressed through basic measures in PoMs. Measures related to the Directives marked in red should be given priority in the EPIRB Project in the first planning cycles.

Urban Wastewater Treatment Directive (91/271/EEC)	Major Accidents Directive (96/82/EC)
Nitrates Directive (91/676/EEC)	Environmental Impact Assessment Directive (85/337/EEC)
Drinking Water Directive (98/83/EC))	Birds Directive (79/409/EEC)
Habitats Directive (92/43/EEC)	Integrated Pollution Prevention Control Directive (96/61/EC)
Bathing Water Directive (2006/7/EC)	Plant Production Products Directive (91/414/EEC)
Sewage Sludge Directive (86/278/EEC)	

In addition, to the measures as listed above, the EU WFD Article 11(3) requires other basic measures than the ones relating to the implementation of other EU Directives. These other basic measures shall prevent any negative impacts on water status and are listed and described below:

- Measures to apply the principle of recovery of costs for water use (WFD Article 9)
- Measures to promote efficient and sustainable water use
- Measures to protect drinking water sources
- Measures to control abstraction and impoundment of surface and ground waters
- Measures to control point and diffuse pollution sources
- Measures to authorize direct discharge into groundwater
- Measures to manage priority substances
- Measures to control physical modifications of surface waters
- Measures that control any other actions that can impact on water status
- Measures to prevent accidental pollution

6.1.2. Supplementary Measures

Supplementary measures are optional and have to be set and implemented in case basic measures cannot ensure the achievement of the environmental objectives and 'good water status'. While basic measures rather relate to the national and basin-wide level through the implementation of national laws, supplementary measures rather relate to the water body and local level. The WFD provides a list of supplementary measures in an Annex listing the implementation of e.g. economic instruments, agreements and regulation codes of practice.

Following supplementary measures can be identified according to Annex VI , Part B to WFD:

(i) legislative instruments

(ii) administrative instruments

(iii) economic or fiscal instruments

(iv) negotiated environmental agreements

(v) emission controls

(vi) codes of good practice

(vii) recreation and restoration of wetlands areas

(viii) abstraction controls

(ix) demand management measures, inter alia, promotion of adapted agricultural production such as low water requiring crops in areas affected by drought

(x) efficiency and reuse measures, inter alia, promotion of water-efficient technologies in industry and water-saving irrigation techniques

(xi) construction projects

(xii) desalination plants

(xiii) rehabilitation projects

(xiv) artificial recharge of aquifers

(xv) educational projects

(xvi) research, development and demonstration projects

(xvii) other relevant measures

As mentioned above, supplementary measures complement basic measures. They should be proportionate in costs, transparent and pragmatic. They are determined in the first WFD planning cycle and need to be checked if they are (i) technically feasible, (ii) if they ensure the achievement of good status in time and in combination with the basic measures, and (iii) if they are disproportionally expensive to achieve the environmental objectives.

In case these checks results in the outcome that the supplementary measures are technically infeasible or disproportionally expensive, exemptions according to WFD Article 4 can be applied .

6.1.3. Programme of Measures proposed in EPIRB project Guidance Document on the Development of Programme of Measures and the Achievement of Environmental Objectives According to the EU WFD.

For the EPIRB Project and to achieve the environmental objectives, it is proposed here to tackle (i)'basic measures' that are linked to the implementation of national legal acts, decrees, procedures and instruments to achieve and maintain environmental objectives.

In addition, (ii) 'soft measures' (as part of supplementary measures) shall be included in the PoM that relate to identified implementation gaps and foresee the adaptation of laws and capacities to become fully WFD compliant in the future. Hence, the following types of measures are recommended as below:

Basic Measures
Measures that will prevent the degradation of water status in a water bodies
Measures that will ensure a stepwise improvement of water status in water bodies
Measures to enhance national water management in relation to water uses (permits; licences)
Soft Measures Types as part of supplementary measures
Supplementary measures as part B of the WFD Annex VI(Table above)
Measures that will be needed to improve e.g. monitoring, national legislations and technical/personnel capacities to ensure WFD compliant implementation in future

Basic measures may e.g. include the construction of wastewater treatment plants to reduce point source pollution, regulated water abstraction and controlled development of infrastructure through the effective implementation of national legislation that takes into account the set environmental objectives.

Soft measures are based on gaps that have been identified during the development of the EPIRB Project RBMP for Central Kura pilot basin and aim to support the competent beneficiary authorities to better plan towards full WFD compliance. Soft measures may e.g. include the improvement of monitoring networks and programmes to comply wit the requirements of the EU WFD (addressing all biological quality elements); improve water status assessment, undertake WFD intercalibration; validate the abiotic typology with biological monitoring; align national legislation to WFD requirements including the permit and licensing process, adapt technical and personnel capacities to enable full WFD implementation.

6.2 National legislation

As currently basin approach identified in WFD isn't applied in Azerbaijan, but the work in this directions is ongoing. Main national legislation related to water sector are :

LAWs	**Year adopted**
Environmental Protection Law	1999
Environmental Safety Law	1999
Specially Protected Natural Areas and Objects Law	2000
Radiation Safety of Population Law	1997
Sanitarian-epidemiological Safety Law	1992
On Protection of Flora	1996
Land Code	1999
Industrial and Domestic Wastes Law	1998
Water Code	1997
Radioactive Wastes Law	1994
Soil Productivity Law	2000
Melioration and Irrigation	1996
Pesticides and agrochemical substances	1997
About fishery	2003
Law on Safety of Hydrotechnical facilities	2003
Water supply and wastewater law	1999

(Source:, MENR, www.eco.gov.az.2014)

The list of norms and standards valid in Azerbaijan is given below, considering parameters of pollutants and elements:

- "Rules for protecting surface water sources form impure water contamination". State Committee on Environment and Control over Use of Natural Resources. Baku, 199473/;

- "Standardizing rules for use and protection of water sources", Resolution #2006 of the Cabinet of Ministers of Azerbaijan Republic, October 15, 1988, article 8
- State Standard #17.0.0.04-90. Recommendations for filling and updating environmental passport of an enterprise. State Environmental Committee of USSR. Moscow, 1990;
- State Standard 17.0.04-90. Environmental passport . Baku, 1990.
- Rules for use of water objects for cultural and community purposes, recreation and sport purposes. Resolution #216 of the Cabinet of Ministers of Azerbaijan Republic (1998)
- Allowable limits of detrimental effects to fishery water bodies. Resolution of the Cabinet of Ministers of Azerbaijan Republic (1999)/
- Guidelines on regulating discharge of pollutants into atmosphere and water bodies. Goskompriroda USSR, 11.09.1989 No.09-2-8/1573
- Rules for state control over protection and use of water bodies. Resolution #198 of the Cabinet of Ministers of Azerbaijan Republic (1998)
- Resolution #150 of the Cabinet of Ministers of Azerbaijan Republic on Application of rules for paid use of water in Azerbaijan Republic (1996)
- Regulations on development and application of limits for use of water. Article #8 (15.10.1998. Council of Ministries' Decision No: 206).
- Resolution #122 of the Cabinet of Ministers of Azerbaijan Republic on Application of fees for use of natural resources, discharge of pollutants into environment, and on use of funds formed from these sources (1992)
- Regulations on processing, preparation, submission, state expertise, approval and application of systems for comprehensive use and protection of water resources – Article #8 (15.10.1998, The Cabinet of Ministers Resolution #206).
- Radiation Safety Norms QN 2.6.1.054-90 (NRB-90);
- State Standard 2874-82. Drinking Water**.** Hygienic Requirements and Water Quality Control;
- SNIP (Construction Norms and Regulations)

  - For water treatment plants: SNIP 2.04.02-84; State Construction Committee, 1985

  - For waste water treatment plants: SNIP 2.04.03-85; State Construction Committee, 1985

6.3. Ongoing government programs related to water resources management

6.3.1 Main ongoing and planned state programs

Currently there are different state program, which relate to water resources or consider some activities linked to water management.Main programs are;

- The "State Program on Social-Economic Development of the regions of the Republic of Azerbaijan in 2014-2018 years".
- National Water Supply and Sanitation Program

- Irrigation water supply project
- National Solid Waste ManagementProgram
- State Program on forestry
- Flood managmentprogram

Several ministries and JSCs are conducting projects related to water resources development and management in the country. The State Agency for Water Resources of MOES is preparing an assessment of surface and ground water resources . The Amelioration JSC is building several new water reservoirs and canals including the water reservoir and hydropower plant on the Shamkir and other rivers. In addition, it is planning to construct three hydropower stations on the Shemkirchay reservoir which is currently used to supply irrigation water.

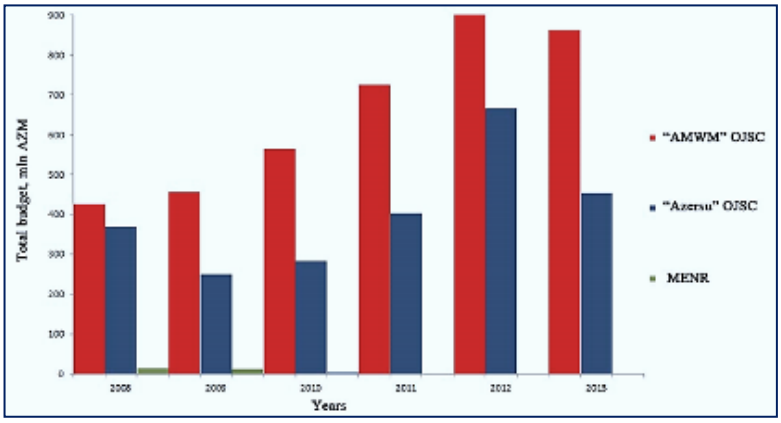
Azersu is building facilities for drinking water supply and wastewater treatment. New wastewater treatment plants are designed for main cities and some of the are under construction in the basin. The project plans to connect all major cities and their nearby villages to the Waste Water Treatment Plant Network in coming few years. The remaining communities will be connected to this network by 2030. Because there are no national standards for the wastewater treatment plants, including limiting effluent values, all newly constructed plants are required to meet international standards. Azersu JSC is also planning to provide continuous (24/7) high-quality water supply to residential areas by year 2030.

The Government of Azerbaijan has also sought active cooperation with international development agencies including the World Bank, ADB, KfW and JICA in implementing/ planning projects directed at the improvement of water sector management. Since 2003, the Government, with the assistance of the World Bank, has implemented three projects to rehabilitate and improve on-farm irrigation systems, and subsequently turn the improved systems over to Water Users Associations (WUAs) for management.

The Rehabilitation and Completion of Irrigation and Drainage Infrastructure Project (RIDIP) and the Irrigation Distribution System and Management Improvement Project (IDSMIP) were implemented by the Amelioration JSC. On-farm irrigation systems serving over 80,000 ha have been completed and work on systems serving an additional 82,000 ha is underway. The third project, Water Users Association Development Support Project (WUAP), is underway to further strengthen WUAs. The projects are considered a success and provide a good model for further rehabilitation and upgrading of irrigation and drainage systems (The World Bank, 20 0/45/

The amount of funds allocated to the three primary water management organizations in Azerbaijan– Amelioration JSC, Azersu JSC and MENR – over the last five years (2008-2013) is shown below (Figure 24).

Figure 24. Budget allocations for water organizations.



The foreign loans and grants are mostly used to supplement financing of infrastructure projects (UNDP/GEF, 2013; page 23).

For example, the Azerbaijan Amelioration JSC received foreign investments totalling 77 million AZN in 2012, whereas MENR received none that year. The internal financial resources are used to build infrastructure and to pay for the recurrent costs including staff

Source: UNDP/GEF, 2013. Azerbaijan National IWRM Plan, page 23.

payroll, system operation and maintenance. The foreign loans and grants are mostly used to supplement financing of infrastructure projects (UNDP/GEF, 2013; page 23).

Azersu JSC has performed well in developing infrastructure for providing water to urban and rural communities. This is reflected in the large government budget allocations and foreign investments it has received over the last decade. However, the sanitary facilities and water treatment plants need increased attention especially in the rural communities.

Main concern regarding the financing of the water sector is that both Azerbaijan AmeliorationJSC and Azersu JSCs are not raising meaningful funds from their water users. At minimum, the water supply companies should raise enough funds from their users to finance normal operation and maintenance costs.

Adoption of the Programs of social and economic development of regions of the Azerbaijani Republic (2004-2008 and 2009-2013) approved by the Decree No. 24 of the President of the Azerbaijani Republic dated to February 11, 2004, had led to tangible results, dynamic economic development of this economic region [Ismail, 1995].

Main objective of the Program is ensuring regional balance in economic development, increase of welfare and a standard of living of citizens in the region, carrying out the consecutive and coordinated policy directed on dynamic development of national economy.

Within 4 years after acceptance of the State Program in the Ganja-Gazakh economic region interest to a private sector thanks to strengthening of the state support of development of business raised. Year 2015 is declared by the Country President the year of Agriculture.

It must be mentioned that, the Ministry of Agriculture, the Ministry of Economy and Industry, Amelioration JSC and local Executive Powers will carry our significant activities in the field of the development of the agriculture of Ganja-Gazakh economic region in 2018 according to the "State Program on Social-Economic Development of the regions of the Republic of Azerbaijan in 2014-2018 years".

Periodically the above mentioned relevant state authorities will carry out the activities in order to support the production and sustainability of the following areas in the rayons of the region:

- Agstafa breeding, seedling, fruit production and viticulture
- Dashkasan breeding, beekeeping, potato production, fruit production (especially wild forest fruit processing), seed production and other activities
- Gadabay breeding, beekeeping, potato production and other activities
- Goranboy breeding, horticulture, grain production, cotton production, vegetable production in greenhouse regime and other activities
- Goygol breeding, grain production, viticulture, potato production, fruit production and winery
- Qazax breeding, potato production, winery, fruit production and vegetable production
- Samux breeding, grain production, winery, fruit production and vegetable production in greenhouse regime
- Shamkir breeding, grain production, winery, fruit production and vegetable production, potato production and other activities
- Tovuz breeding, grain production, winery, potato production, beekeeping, seedling, seed production and other activities.

6.3.2. National Water supply and Sanitation Program

Under National Water Supply and Sanitation Program it is considered to use 1.6 m^3/sec water from the Shamkirchay water reservoir system which is under construction in order to supply Ganja, Shamkir, Samukh cities and their surrounding villages as well as the close villages of Goranboy region with drinking water. Considered water demand for Shamkir city is 150 l/sec; for Ganja city is 600 l/sec; for Nabiaghali city is 40 l/sec, totally is 790 l/sec.

By information of regional office of Azersu on May 2014 by support of Islamic Development Bank under National WSSS rehabilitation program new water supply system will be constructed in 2015 in Gazakh city Water will be taken from underground wells near Garahasanli village of Agstafa rayon on right bank of Agstafachay river . Waste waters will be treated at WWTP located in Dagkasaman village og Akstafa raion and will be used for irrigating of green areas..

In Agstafa raion by the beginning of 2014 WSSS has been rehabilitated . Water supply is being carried by 6 sub artesian wells near Vurgun village. Waste waters are treated in WWTP located near Poylu village and used for irrigating of green areas after treatment .

Under new National WSSS rehabilitation project waters of Shamkirchay reservoir through the underground concrete pipes will be delivered to Shamkir and Ganja cities by the end of this year or in 2015. This will also improve drinking water supply in Ganja

Water supply and sanitation system rehabilitation work in Tovuz city also according to the National WSSS rehabilitation program is under completion and will be fully operational by end of the year of by 2015 by use of Zayamchay river bed waters. New WWTP (near Girzan village) is supposed to treat waste waters and discharge them into nearby located lowland area. Total cost of project was around 80000AZN(40% for water supply and 60% for sanitation system)..

Now government is planning to start rehabilitation of Water Supply and Sanitation System of Gazakh city by financial support of Islamic Development Bank. By this project ground waters located at right bank of Agstafachay near Garahasanli village of Agstafa rayon river will be pumped. Sewage system will be created in Dag Kasaman village area and treated water will be used for irrigating of green areas

In Akstafa city water supply and sanitation system just rehabilitated(2014). Before water was used from Hasansu river and from some sub artesian wells. By ACCORD Company new water abstraction site is ground waters(6 sub artesian wells) located near Vurgun village. Waste water treatment facility is constructed in Poylu village and treated waters are used for irrigating of green areas (before they were discharged to Agstafachay river without treatment.

Therefore it would be important to include the point below Poylu village on Agstafachay river into JFS program to see how quality of water changes.

WSSS current status and plans for near future is given in Annex 12

In the region there are small or medium sized agglomerations, which attribute to the diffuse pollution to the surface water bodies in the area. The implementation of the Urban Waste Water Directive (91/271/EEC) in Azerbaijan can be expected to result in a significant decrease of the load, since all agglomerations with a population equivalent higher than 2000 can be served by sewerage collection and respective treatment.
Currently there is need to conduct study in coming years to implement program of measures on development of

- Partly centralized water supply system for residential areas with population over 2000 persons
- Centralized water supply system for residential areas with population over 5000 persons

m for residential areas with population over 5000 persons

- Improvement of state of used by residents *individual septic tanks* according to environmental requirements for residential areas with population over 2000 persons
- Development of sanitation system for residential areas over 5000 persons and connecting them to waste water treatment plants

6.3.3 Irrigation water supply project

As mentioned above since 2003, with the assistance of the World Bank projects to rehabilitate and improve on-farm irrigation systems, the Rehabilitation and Completion of Irrigation and Drainage Infrastructure Project (RIDIP) and the Irrigation Distribution System and Management Improvement Project (IDSMIP) were implemented by the Amelioration JSC.

Rehabilitation and improvement of on-farm level irrigation distribution systems, and their subsequent turnover to WUAs for management, is a priority Government undertaking (World Bank, 2012: page 4).

The Water Users Association Development Support Project (WUAP), is underway to further strengthen WUAs. The projects are considered a success and provide a good model for further rehabilitation and upgrading of irrigation and drainage systems (The World Bank, 2012).

In recent years in Azerbaijan the on-farm systems serving over 80,000 ha have been completed with World Bank and IFAD assistance and work on systems serving an additional 82,000 ha is underway. An additional $900 million is required to complete this work on the balance of the irrigated area.

In pilot region in order to provide year round water supply for different user there are ongoing work on construction of water reservoirs on rivers of Ganja-Gazakh pilot region. The Information about Shamkirchay and other water reservoir which are under construction or planned to be constructed is given in Ammex 13

By the information of Amelioration JSC river continuity will be provided in new reservoirs, including fish by passes. There will be also downstream water discharge plans to provide water in river downstream during the year.

Work on rehabilitation of old and construction of new water canals already has started in the region and soon it is expected that water losses from irrigation infrastructure will significantly be reduced.

Main issue to be considered now should be provision of environmental flow requirements in downstream .

One of necessary action currently can be conducting of study of environmental flow requirements of all rivers of the region in different key points along the rivers.

6.3.4 Water scarcity problem management

To manage water shortages, both demand-side and supply-side strategies that are well grounded in information management system should be developed. On the demand side, improvement of water use efficiency should have high priority especially for the irrigated agriculture sector. This could be accomplished through physical measures such as canal improvements and installation of required flow control and measuring structures; and/or policy measures such as levying of appropriate irrigation service fees. Demand management in river basins is

critical, and water agencies must raise awareness that water is a scarce resource and that all water users need to practice water conservation.

On the supply side, measures could be taken to increase the amount of water available for agriculture, city water supply and other societal needs. Universally practiced water conservation measures include small water storages, rainfall water harvesting and waste water recycling. Small storage reservoirs can be integrated in irrigation improvement and watershed enhancement programs to capture excess runoff and make it available for productive purposes. Similarly, harvesting of rainfall can also provide individual households with good quality water for domestic purposes. Development of groundwater can also provide additional water supplies for domestic use and irrigation.

One of significant steps to combat water scarcity is the development of Climate change adaptation measures, including the improvement of state of current water management infrastructure and use of alternative water resources. For example as shown in below table also in addition to surface water use can be increased ground water use.

Table 31. Ground Water use balance

Water balance elements	Water balance	
	Existing mln.m^3	Expected by scenario(2050)
Ground water exploitation reserves	+1400	+1300
Ground water abstraction	-350	-650
Balance	+1050	+650

In total problem of surface water shortage can be solved by implementation of water conservation measures shown in Table 32

Table 32. Water conservation measures

Water balance elements	Water balance	
	Existing mln.m^3	Expected by scenario(2050)
Reduction of water losses during extraction , transportation and use	350	350
Treatment and use of waste waters	50	50
Balance	+40	+400

As one can see from above tables if reduce of water loses and provide treatment and use in agriculture of waste waters can allow to solve surface water scarcity in the future. But as water resources aren't distributed equally in the year therefore in order to provide water supply and environmental flow in rivers there need to develop some sceneries on use of ground waters in low flow periods, capacity of which is quit enough to do this.

As a pilot measure can be considered:

- Tariff reforms
- Development of rainwater harvesting options
- Development of groundwater use program
- Measures on efficiency water use and reduction of water losses

6.3.5. Hydropower generation

Now construction of new non-polluting power sources, small hydropower stations for the purpose of use of capacity of the small rivers hydraulic power is planned (Annex 16.).

Shamkirchay water reservoir is being constructed for irrigation purpose, moreover it is planned to construct 3 power stations in order to produce additional electric power by using water power. The waters used in such hydroelectric stations will be re-discharged to Shamkirchay River. This means significant negative impact on the quantity of Shamkirchay River's water reservoirs is not expected.

These 3 power stations have below characteristics:

- HPS capacity: 24438 KWt
- Annual energy production: 56 million KWt/ hour

It is planned to install HPP in other new reservoirs as well

Main issue in the process of extending of HP network in the region is morphological changes of WBs. There is need to make sure that WFD objectives in this process are implemented and all construction and exploitation process should meet requirements.

6.3.6. Flood protection measures

Some traditional **engineering methods** are used for flood management. Basically, they are the following:

- construction of reservoirs;
- management of river basins;
- strengthening of river banks;
- cleaning riverbeds from siltation and sediments;
- branch of flood waters in special places.

In construction of reservoirs it is supposed significantly decrease the flood wave and reduce peak of flood in the river below the dam. The main idea in management of a river basin is reduction of a surface runoff during the flood period. The engineering methods are widely used for flood management in Azerbaijan and in Ganja-Gazakh pilot area as well.. More than 100 water reservoirs had been constructed in the country during the period after the Second World War with the aim to regulate irrigation of lands in arid areas of the country.

The other action undertaken so far is strengthening banks of rivers with concrete, stone and sand dams protects the river and its valley, and also territories close located to a valley and provides an opportunity to protect them from floods. Cleaning of the river bed from siltation positively affects runoff, accelerates running period of flood wave, decreases the level, create condition for surrounding areas become flooded.

As all above measures lead to heavily modification of water bodies therefore there is need to assess impact of those engineering measures to the status of water bodies according to EU WFD requirements and after socio-economic and environmental impact assessment it can be decided what is the best way to solve the flood problems.

It should be noted that below given currently world wide used non – engineering methods should also be applied in the region in this regards:

- establishment of the centralized crews and control system;
- establishment of monitoring system for forecasting and warning;
- forestation;
- insurance against floods;
- evacuation of population.

The unified teams and control systems reduce negative impact of floods and partially prevent them. Drastic improvement of hydrometeorology and remote sensing technologies provides opportunity for creation of forecasting and early warning systems.

Precise forecast of heavy rain within the short time is highly important for forecasting rain floods and mudflows. The automatic system was established in experimental polygon on Active Impact to Atmospheric Processes of the National Hydrometeorology Department of the Ministry of Ecology and Natural Resources in Aghstafa through application of Meteorological Radio Locator (MRL) – 5 and modern program complex.

Insurance against floods provides opportunity to get compensation for the certain part of the damage faced as a result of floods. Unfortunately natural disasters, extreme cases and damage as a result of these cases are not attracting the attention of insurance companies (3).

The Parliament of the Republic of Azerbaijan has adopted the law on activity of insurance companies in 1999. However this law is almost ineffective in regard to natural disasters.

Construction of new residential settlements in territories where floods are taking place every five years is forbidden in several countries. İt üould be important to strengthen the lagal basis in Azerbaijan in this field

6.3.7. Solid waste management

Solid Waste Management in Azerbaijan has become a Government priority. On September 28, 2006, the Presidential Decree No. 1697 issued the Environment State Program (ESP) and established a comprehensive plan for clean-up and remediation, hazardous and non-hazardous waste management, and other environmental management through renovating facilities and improving laws and regulations. Since then, Azerbaijan has embarked on an ambitious agenda to change the current practice of Solid Waste Management (SWM) throughout the country.

Despite the progress made in rehabilitating selected landfill sites and investing in modern treatment infrastructure, basic principles of modern integrated solid waste management have yet to be put in place.

Government of Azerbaijan is planning the preparation of National Solid Waste Management Strategy and Action Plan based on regional cooperation between the administrative raions. Within the Integrated Solid Waste Management Project implemented together with the World Bank, the following tasks are expected in the framework of National Strategy:

Information and Data gathering. This will include:

- Desk study on Existing Conditions
- Data collection with the following information relative to each districts in the region:

- Waste generation data.
- Collection, Treatment, and Disposal Service Characterization.

- Institutional Responsibilities and Capacity.
- Existing Budgets and Financial Resources.
- Waste Characterization Studies/surveys.

Deficiencies Assessment – Based on the above activities, a deficiencies analysis which will include consideration of existing SWM deficiencies associated with 1) service provision, management and technical deficiencies, 2) economic/financial deficiencies and 3) institutional and capacity deficiencies will be conducted.

6.3.8 Forestry related measures

A plan for reforestation is necessary in the basin. Reforestation has to be restored in the natural vegetation cover in the areas where human activities have resulted in deforestation, and

- which are vulnerable for soil erosion,
- where reforestation will support recharge of important aquifers,
- where reforestation will change the runoff regime of the rivers back to the natural conditions (decreasing number and severity of landslides, mudflows and flooding and increasing the minimum flow),
- where reforested areas can provide important forest services for the local population and make the area more attractive for tourists.

The restoration of forests will result in formation of forests with the basic biodiversity. The activities which can be included in reforestation project:

1. Development of the map of basic vegetation cover within the basin.
2. Identification of appropriate areas where forests can be restored.
3. Protection of newly planted forests.

6.3.9. Ground Water related measures

After conceptual presentation of groundwater system and brief analysis of human impact classification tests wer e conducted for seven delineated GWB in Central Kura river basin. All GWB are assigned a good quantitative and chemical and status. Local pollution is observed in Ganja Gazakh plain and particularly around the main cities, but it does not influence overall status of groundwater bodies.

It should be noted that quantitative indicators of ground waters also meet requirements in relation to their recharge. Of total 1,5 km3 amounts of ground waters currently only 20% is used for irrigation and drinking water supply and in future these waters can be considered as an alternative to surface waters sources , but there is need to make study in relation to possible impact to qualitative and quantative indicators of graound watewrs by indicating measures on recharge and ecological status improvement of ground water sources.

In conclusion PoM should also take into account:

- to implement the necessary measures to prevent or reduce the discharge of pollutants into groundwater and to prevent deterioration of the status of all groundwater,

- to protect, to upgrade and restore all groundwater bodies, ensure a balance between abstraction and recharge of groundwater in order to achieve good status and
- to implement necessary measures to reverse any significant and sustained upward trend in concentration of any pollutant, due to human activity in order to reduce the pollution of groundwater over time

6.4 List of identified Basic and Supplementary measures for Central Kura BD

As mentioned above basic measures include implementation of EU directives through application and where necessary revising of national legal and institutional framework.

Number of basic and supplementary measures identified for Central Kura pilot area is given in

Annexes 1 and 2 accordingly.

Basic measures identified in Annex 8 mainly include measures :

- Required under EU WFD, UWWTD, Directives 76/160/EEC and 2006/7/EC "on the management of bathing water quality" , Directive 91/676/EEC on the protection of waters from nitrate pollution from agricultural sources , Directive 96/61/EC on integrated pollution prevention and control , Directive 2007/60/EC on the assessment and management of flood risk , Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ,
- On pricing policy,
- On priority substances,
- Taken under Article 11 (5) for water bodies which are unlikely to achieve environmental objectives under Article 4.
- Pollution control,
- On promoting efficiency water use and abstraction control
- Administrative measure: Creation of BMO and RBC.
- Provision of efficiency Water Supply and Sewage system management at rayon centers

List of Supplementary measures is given in Annex 2

Supplementary measures include measures on :

Creation of BMO and RBC;

- Provision of efficiency Water Supply and Sewage system management at rayon centers and large settlements, Water conservation and efficiency water use measures,
- Emission control measures,
- Economic and educational measures

For each of measures in the Annexes has been identified responsible agencies and period of implementation.

6.5. Programs of measures for WBs at risk or possibly at risk in Central Kura Pilot area

Set environmental objectives refer to the timeline of the six-year WFD planning cycles. When the measures of the PoM are in place they need to be aligned to this timeline of the planning cycles re- emphasising when the environmental objectives will be achieved.

In this context it is proposed to present the PoM and its implications in such a way that they clearly show (i) the key basic measures to be taken including a cost estimate as well as soft measures as part of the supplementary measures (ii) what national legal adaptations might be needed towards full WFD compliance and (iii) what technical and personnel gaps might have to be filled.

Below is very briefly summarized as well as outlines a stepwise proposal how to develop PoMs with EPIRB project:

STEP 1	Set environmental objectives for each water body taking into account exemptions.
STEP 2	Align national legislation that directly correspond to the other EU Directives outlined in **Figure 1** (specifically the UWWT Directive, Nitrates Directive, Drinking Water Directive, habitats Directive) in order to be used within the PoM as basic measures.
STEP 3	Identify basic and supplementary measures that will be needed in principle to achieve the set environmental objectives
STEP 4	Align the identified basic and supplementary measures to the environmental objectives and the six-year planning cycles. The first planning cycles should focus on soft supplementary measures that aim at ensuring full WFD compliance. For basic measures priority should be given to the UWWT Directive, Nitrates Directive, Drinking Water Directive, Habitats Directive.
STEP 5	Align cost estimates to the identified measures.

Depending the redness of the country to start concrete practical work to improve status of WBs this process may not happen in 2021 but it is for sure that by 2027 this process will be effective. Therefore in below objectives implementation of supplementary measures to ensure WFD compliance will be planned by 2021 but PoM to improve of water body status depending on circumstances may help to reach objectives by 2021(if relevant steps will be taken during 2015-2021) or in second planning circle(2027). Therefore some adjustments are made to the Table of EPIRB project guidance(see below Table 33).

Table 33: Proposal to align basic and supplementary measures to environmental objectives and the six year planning cycles for the PoMs within the EPIRB Project.

	Water Status 2015	Environmental Objectives	Align Implementation of Basic and Supplementary Measures
	1	2	3

1	Water bodies in **high or good status in** **2015**	1..Need the setting of environmental objectives and 1.1. measures that maintain water status over all six- year planning cycles up to 2033 and beyond.	1.1Identify basic measures based on other EU Directives and national legislation that ensure maintenance of water status and no further degradation(Annex 8). 1.2. Identify soft supplementary measures to ensure WFD compliance by 2021 specifically regarding monitoring programmes and status assessment(Measure 15, Annex 9) but also regarding other aspects that will ensure WFD compliance (e.g. technical capacities; legal basis; intercalibration which are identified in Annex 9).
2	Water bodies that are (i) **at risk to fail the environmental objectives in 2015** or (ii) in **moderate status in 2015**	2..Need the setting of environmental objectives **within the first planning cycle (= by 2021):** 2.1.(i) to **have WFD compliant status assessment in place by 2021** and 2.2.(ii) to achieve **good status by 2027** **or** 2.3.Identify exemptions	2.1 Identify soft supplementary measures to ensure WFD compliance by 2021 specifically regarding monitoring programmes (Measure 15, Annex 9) and status assessment but also regarding other aspects that will ensure WFD compliance (e.g. technical capacities; legal basis; intercalibration which are identified in Annex 9). 2.2.Identify a high priority basic measures that are financially/technically feasible focusing on UWWT Directive, Nitrates Directive, Drinking Water Directive, Habitats Directive(Annex 8).
3	Water bodies that are (i) **at risk to fail the environmental objectives in 2015** or (ii) in **poor status in 2015**	3.Need the setting of environmental objectives**:** 3.1. (i) to **have WFD compliant status assessment in place within the first planning cycle (= by 2021)** 3.2. (ii) to achieve moderate status by **2027, good status by 2033** **or** 3.3 Identify exemptions	3.1 Identify basic measures to achieve the set environmental objectives (Annex 8) . 3.2Further identify soft and other supplementary measures to ensure WFD compliance beyond the ones that have been implemented by 2027(Annex 9).

	Water bodies that are (i) **at risk to fail the environmental objectives in 2015** or (ii) in **bad status in 2015**	4. Need the setting of environmental objectives**:** 4.1. (i) to **have WFD compliant status assessment in place within the first planning cycle (= by 2021)** and 4.2.(ii) to achieve poor status by 2027, **moderate status by 2033 and** Good status by 2039 **or**	4.1. Identify basic measures to achieve these environmental objectives(Annex 8). 4.2.Further identify soft and other supplementary measures to ensure WFD compliance beyond the ones that have been implemented by 2027 or 2033(Annex 9).

Program of Measures for Water bodies categorized as at risk due to both hydromorphological and pollution problems is given in Annexes 8 and 10

6.6. Priority measures to be implemented in Central Kura BD in first planning cycle (2016-2021)

In order to identify and priority measures to meet environmental objectives of WFD in Central Kura pilot basin following existing and planned actions have been taken into consideration:

- Ecological status of water bodies and needed action to meet environmental objectives
- Ongoing state programs in water sector and related other areas like improvement of water supply and sanitation system, improvement of irrigation water use efficiency, reduction of water pollution through improved solid waste management, programs for protected areas etc
- Implementation of different water related EU Directives through development of relevant legal and institutional basis

As under different state programs work on improvement of water supply and sanitation system in main cities of the region and also improvement of irrigation water use efficiency, rehabilitation of irrigation infrastructure to reduce water losses has already started and also under National Solid Waste Management program there will be conducted improvement of solid waste management in the region in coming years according to international standards therefore in this document cost effectiveness assessment for those activities hasn't been carried as funding for this projects is already decided by government, instead of that was estimated cost of measures identified in the RBMP(see below). It also should be noted that when implementing such projects government in parallel to their economic importance also pays high attention to social and environmental aspects as a priority requirement for regional development.

From this perspective in the sphere of water supply and sanitation it is necessaryto conduct study to improve / create water supply and sanitation system for residential areas with population over 2000 and over 5000 inhabitants.

There is also need to improve water use control system, development of relevant tariff for different water uses, identification of pollution control and water conservation methods.

In total 16 basic and 15 supplementary measures have been identified in Central Kura BD. As a first steps to be implemented in first cycling period (2015-2021) after prioritization 8 high priority basic measure and 9 high priority supplementary measure have been selected in the RBMP and are given in Annexes 14-15.

When selecting of these measures the ecological effectiveness of the measures proposed expert assessment was used. But also has been taken into account requirements given in "Cause/Effect Matrix with Classification of Priority" and "Classification Key" tables proposed in the EPRIB guidance document. Mainly below of Ecological Deficits (WFD, Annex V) number of entries have been taken into account when prioritizing of measures:

- Macrophytes
- Algae
- Benthic invertebrate fauna
- Fish fauna

For above indicators four levels were used: No Ecological effectiveness, Low Ecological effectiveness, Medium Ecological effectiveness and High Ecological effect.

7. PROTECTED AREAS

7.1. Main protected areas in the Central Kura BD

National parks, reserves and sanctuaries are created for **the** areas where natural complexes of preferential ecological, historical, aesthetic and this kind of values located on and used for nature conservation, education, scientific, cultural and other purposes.

There exists one National Park(Goygol), 2 State Nature Reserves (Garayazi, Eldar Shami) and 4 State Nature Sanctures (in Gadabey, Goygol, Agstafa and Shamkir regions) in the pilot basin district. All these areas are designated for the protection of habitats and species(Annex 11).

The Goygol lake is located within the Goygol national park, which is specially protected water body. The lake has a sanitary protection zones to protect it from human impact as it is used for the abstraction of drinking water for Ganja and Goygol cities.

In addition to the Goygol Lake, there is another lake with the same name fed by Shamkirchay River that also have sanitary protection zones to protect the surface waters and groundwater wells. The lake is used for abstraction of drinking water. According to the Azeri legislation, width of this zone should be up to 500 m.

Other lakes and reservoirs, such as Jandar, Agstafachay, Akhindjachay, Shamkir, Yenikend has water protection zones as well of 500 m width.

There are some small water reservoirs and pools with the area of less than 2 sq km that have protection zones of 300 m. These water bodies are considered to function according to the below categories identified in EU WFD:

- Protected areas of the recreational waters;
- Areas designated to protect economically significant aquatic species (fish farms);

Almost all rivers of the region are used for drinking and recreational purposes. According to the Azeri legislation there should be water protection zones with width of 50 m (for rivers of less than 10 km length) and 100 m (for rivers of more than 10 km length). Unfortunately these requirements are not followed currently, which is clearly seen in residential areas where rivers are significantly affected by human impact.

In Annex 7 is given information about the main protected areas in the region.

7.2. Environmental objectives for protected areas

Environmental objectives for ecosystems in protected areas are conservation and sustainable use their resources.

Objectives for Strict Nature Reserve (Specially appointed area a possessing some outstanding or representative ecosystems, geological or physiological features and/or species, available primarily for scientific research and/or environmental monitoring) are:

¨ To preserve habitats, ecosystems and species in as undisturbed a state as possible;

¨ To maintain genetic resources in a dynamic and evolutionary state;

¨ to maintain established ecological processes;

¨ To safeguard structural landscape features or rock exposures;

¨ To secure examples of the natural environment for scientific studies, environmental monitoring and education, including baseline areas from which all avoidable access is excluded;

¨ To minimize disturbance by careful planning and execution of research and other approved activities;

¨ To limit public access.

Objectives for National Parks (protected area managed mainly for ecosystem protection and tourism) are:

¨ To protect natural and scenic areas of national and international significance for spiritual, scientific, educational, recreational or tourist purposes;

¨ To perpetuate, in as natural a state as possible, representative examples of physiographic regions, biotic communities, genetic resources, and species, to provide ecological stability and diversity;

¨ To manage visitor use for inspirational, educational, cultural and recreational purposes at a level which will maintain the area in a natural or near natural state;

¨ To eliminate and thereafter prevent exploitation or occupation inimical to the purposes of designation;

¨ To maintain respect for the ecological, geomorphologic, sacred or aesthetic attributes which warranted designation;

¨ To take into account the needs of indigenous people, including subsistence resource use, in so far as these will not adversely affect the other objectives of management.

Objectives for Natural Monument (protected area managed mainly for conservation of specific natural features) are:

¨ To protect or preserve in perpetuity specific outstanding natural features because of their natural significance, unique or representational quality, and/or spiritual connotations;

¨ To an extent consistent with the foregoing objective, to provide opportunities for research, education, interpretation and public appreciation;

¨ To eliminate and thereafter prevent exploitation or occupation inimical to the p purpose of designation;

¨ To deliver to any resident population such benefits as are consistent with the other objectives of management

Main environmental objectives for protected areas is to have the EU WFD compliant register and management plan for them by 2021 and implement the main management objectives identified in management plan by 2027.

7.3. Programs for Protected areas

In the Central Kura Basin district protected areas can be divided into 2 groups:

- Main protected areas identified by government

- Sources of freshwater used for drinking water supply to be protected by Azersu.

Map of location of main protected areas and scheme of location of sources used fro drinking water supply is given in Figure 25

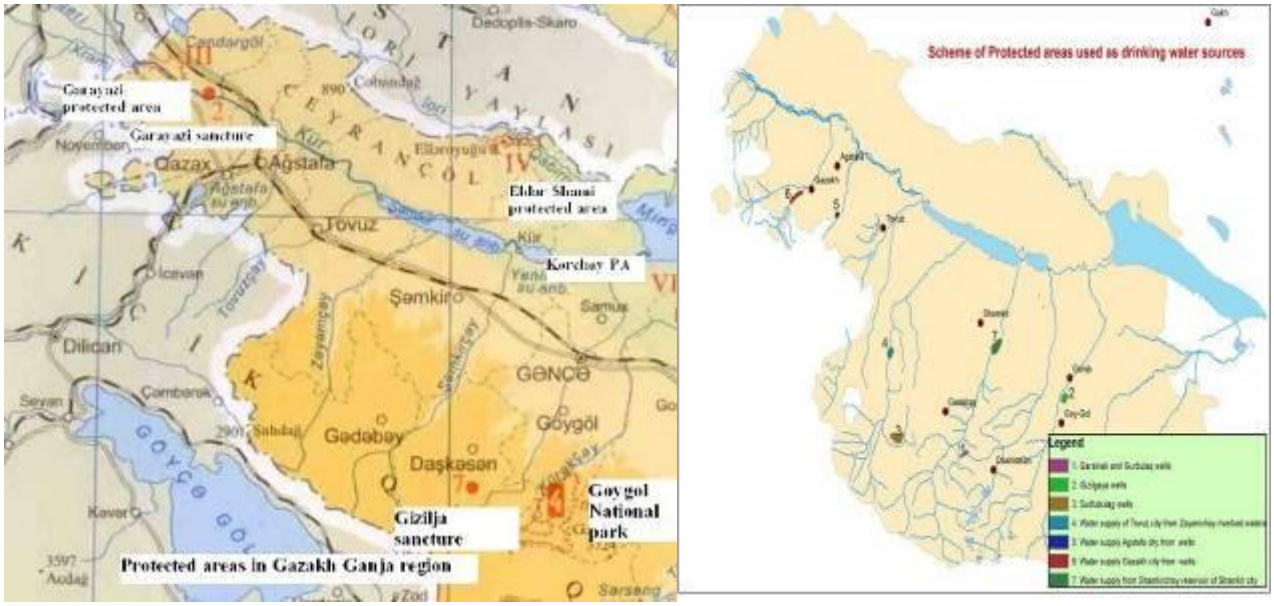


Figure 25. Map of location of main protected areas(leftt) and those used as drinking water (right) (Source: MENR, www.eco.gov.az)

PoM for main protected areas identified by MENR

Similar work as a second PoM can be conducting in cooperation with relevant departments of MENR study if implementation of below programs on Protected Areas are according to EU Directives.

Below is described some currently ongoing activities related to main protected areas identified by MENR.

Goygol National Park was established on April 1, 2008 with the Order of the President of the Republic of Azerbaijan. The principal aim of establishment of Goygyol National Park is protection of endemic and endangered flora and fauna species, regulation of the stability of natural complexes, creation of more favorable condition in order to conduct scientific – research activities, environmental monitoring, raising awareness of population and development of ecotourism in potential touristic areas.

Rare species such as, Caucasian red deer and trout (fish in Goygol lake) are protected in the national park. Beautiful and variegated nature, rich flora and fauna of Goygyol National Park will enable to organize and develop ecotourism in the area by attracting tourists and visitors.

Garayazi state nature reserve is created in 1978, area 9.656 ha, **located** within the territory of Gazakh administrative district, on the bank of the River Kura in the Agstafa forestry.

The Gara-Yaz State Reserve for the protection and restoration of the Kura tugay forests. The Gara-Yaz reserve is in the western part of Azerbaijan. Its territory covers the flood lands of the River Kura and the Gara-Yaz Lowland on the left bank of the River Kura. In the region where the reserve is situated, the tugay forest and steppe lowland landscapes are typical. In the past, a continuous line of tugay forest extended along the middle and lower reaches of the River Kura, which was surrounded by forest to an extent of 600 km. The territory of the reserve is part of the quaternary accumulative lowland, sloping slightly to the River Kura. Here the climate is that of moderate warm semi-desert and arid steppe, for which a warm and dry summer and moderate winter are typical. The main protected objects are the biggest tract of tugay forests of the middle reaches of the River Kura and the rare and endangered ecosystems of tugay. Along the river, shrubbery of willow, hawthorn, barberry, elaeagnus and others grow(MENR, *www.eco.gov.az*).

Eldar shamy state nature reserve is founded in 2004 **area** 1686 ha , located **w**ithin the territory of Samukh administrative district.

The Eldar pine-tree State Reserve was established to preserve the genetic heritage, biological diversity of ecological systems, unique forests of Eldar pine trees. The pine trees growing here are of 100-120 years old and 2-6 m high. Fauna in this reserve area is not very variable – among animals only hares inhabit here and among birds – partridges. Eldar pine tree is included in the Red Book of Azerbaijan Republic. There are also 4 State Nature Sanctuaries in the region.

There is need to conduct study to apply EU legislation to protected areas in basin. According to Article 6 of the Water Framework Directive (WFD) 'Member States shall ensure the establishment of a register or registers of all areas lying within each river basin district which have been designated as requiring special protection under specific Community legislation for the protection of their surface water and groundwater or for the conservation of habitats and species directly depending on water'. More specifically, the register of protected areas required under Article 6 of the WFD includes the following types of protected areas (Annex IV of the WFD):

- areas designated for the abstraction of water intended for human consumption under Article 7;
- areas designated for the protection of economically significant species; bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC;
- nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC and areas designated as sensitive areas under Directive 91/271/EEC; and
- areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EC and Directive 79/409/EEC.

PoM for protected areas used for drinking water supply.

It should be noted that currently Government has plans to protect areas which according to ongoing water supply state programs are identified as sources of drinking water in Central Kura River Basin District, These are as follows:

- Water supply from Shamkirchay reservoir of Shamkir city and from Shamkirchay reservoir and Goy-gol lake of Ganja city: the area within 300m from the shoreline of reservoir (which corresponds to at maximum water level) surface is considered as protected area within which no economic activity should be allowed.
- Water supply from ground water aquifers of Dashkasan city (Garainak and Gurbulaq wells), Ganja city(Gizilgaya wells) and Gadabay city(Sudlubulag wells 1 and 2): in 30m diameter from well no economic activity is allowed amd after 30m till 100-150m limited economic activity is allowed. If water is supplied from springs: 200m upper, 100 m down and in left and right sides of spring no activity is allowed.
- Water supply of Tovuz sity from Zayamchay riverbed waters, Agstafa city from wells located at left bank of Hasansuchay river, of Gazakh city from subartesian wells located along Agstafachay river: river protections zones should be applied here

This work currently is carried by Azersu and as PoM within the Central Kura BD RBMP it is decided to conduct study situation in this area to see:

- If all protected areas used as drinking water sources are identified and protection measures are established
- If there is any conservation problem in relation to these protected areas
- What is needed for improvement of implementation of programs for protected areas and harmonization with relevant EU Directives in relation to protected areas.

This PoM can be implemented during 2016-2021 by MENR, Amelioration JSC ,Azersu JSC in close cooperation with the local authorities in the Central Kura BD.

8. ECONOMIC ANALYSES

8.1. Introduction

The WFD requires that basin management plans in Europe considered not only hydrological, or water quality issues, but also economic aspects. Economic principles are addressed by WFD Article 5 (and Annex III) and Article 9..

The provision of Article 5 requires assessment of the following economic issues:

- The degree of accomplishment of the principle of cost recovery for water services as a tool for appraising economic efficiency and equity. The economic analysis must include the long term forecast of supply and demand, and, where data is not available, estimates of volume, price and cost associated to water services are acceptable.
- The most cost-effective combination of measures in respect of water uses should be included in the program of measures under Article 11 based on estimates of the potential costs of such measures. Moreover, Article 9.1 of the WFD establishes that environmental and resource costs must be taken into account for water services, according to provisions of Annex III and particularly to the polluter pay-principle.

The economic analysis described in this report consists of two main parts:

- The cost recovery of water services;
- The economic characterization of water uses, the future trends, measures and activities for enhancement of information and knowledge base.

The cost recovery of water services is analyzed for different users, by considering storage and main transportation, distribution, sewage collection, waste water treatment, and the environmental and resource cost. The water services analyzed are:

- Freshwater provision to domestic uses (households, industry and tourism) and irrigation ;
- Urban Waste Water collection and treatment
- Other sectors affecting water resources .

Regarding the economic characterization of water uses, the analysis is carried out for the different types of users. Firstly, a review of the water services is provided, portraying the historical background of water resources management in the country, referring the recent trends concerning water supply and describing the administration and the policy framework that governs the use of the water resources in the country.

Cost effectiveness of water supply and sanitation system and irrigation water use in the region has been assessed in this RBMP and proposals on their improvement are prepared.

As under regional development and other state programs many water related projects are being implemented in the region, including those of improvement of water supply and sanitation, improvement of irrigation water supply services and infrastructure, improvement of solid waste management system. For all these projects implemented in rayon centers in pilot area demographic changes, development of industry, economy and agriculture is taking into account and the financing is identified through state budget or other IFIs.

Therefore more specific attention in this chapter is given to measures on application of different EU Directives through improvement of legal and institutional basis and also conducting of studies on improvement of water supply and sanitation systems, solid waste management and other environmental problems existing in the region.

Implementation of these measures in the first and second planning periods can help decision makers to develop more environmentally friendly socio-economic and other development programs in the region.

Main trends of key climatic and socio-economic drivers in Central Kura Basin District are listed in Annex 20

8.2. Economic assessment of water services

8.2.1 Economic assessment of drinking and industrial water supply and sanitation services

Currently State owned JSC Azersu is responsible for country wide water supply and sanitation services, including the Central Kura pilot region. In total of supplied by Azersu waters 25.8 mln. m^3 was used in the region for drinking purposes, 8.8 mln. m^3 for production (industrial use) purposes in 2013, in accordance to the information provided by State Statistics Committee of Azerbaijan Republic(Azerbaijan State Statistics Committee,2014).

In order to conduct cost benefit assessment of the services conducted by the company it was discovered that total water losses during transportation of water by company infrastructure makes 30%. Therefore amount of delivered to users drinking and industrial water makes in Central Kura River basin district 18.06 mln. m^3 and 6.16 mln. m^3 respectively.

Current water supply services tariffs for population is 0.36 AZN (0.30 AZN for drinking water and 0.06 AZN for waste water collection services) and for industry 1.30 AZN per 1 m^3 of supplied water

Total cost of water supply and sanitation services then can be calculated as :

- For drinking water supply and sanitation for population: 18.06*0.36= 6.50 Mln AZN
- For industrial water use: 6.16*1.30= 8.01 Mln AZN

It should be also noted that currently collection rate is low. Many people do not pay fees for water supply sanitation services explaining this with their incomes being low. Therefore collection fees from population does not exceed 50%. Some industrial entities also do not pay fees explaining this with their financial and production difficulties and therefore collection rate from industries makes around 70%. In total one can approximately assess that total amount of collected fees doesn't exceed 10 Mln AZN

One can see total production cost (including 30%water lost during transportation) can be around:

- For drinking water services: 6.5 Mln AZN*100/70= 9.29 nln AZN
- For industrial water supply: 8.01 Mln AZN*100/70= 11.43 nln AZN

In total cost of services exceed 20 Mln AZN.

Therefore currently implemented National Water Supply and Sanitation Program financed by support of international Financial Institutions in parallel to rehabilitation of Water Supply and Waste Water Systems also contain some institutional reforms to improve cost effectiveness of services.

Below are given some possible options which can be helpful in this direction:

- Installing of water meters with Smart Cards to reduce uncontrolled water use
- Differentiated approach should be applied in water tariff and tariff can be higher for over use of drinking water(in yards and other purposes). For example, in average amount of drinking water use per person per month is proposed to be 6 m3 and for use of water over 10 m3 per person in month tariff can be increased up to the level of industrial water use tariff.
- For group of population with low income tariff should be affordable
- Tariff for waste water collection from population currently makes 0.06 AZN which can also be increased to affordable level.
- There is need to study how for residential areas with population over 2000 persons can be applied centralized water supply and how can be improved sanitation system(location of pits, prevention of leakages from them to ground waters, organizing of timely and safe transportation of wastes from there to needed destinations).
- There is need to conduct study for development of waste water collection system for residential areas with population of over 5000 habitats and selection of proper location and design of waste water treatment facility to serve several such settlements)
- As number of population of the region increases(about 1% per year), therefore there is need to assess water supply programs for different period by integrating population increase with the improvement of system efficiency and also amount of needed water according to the trends in water demand.
- There is need to assess real cost of services and spending of water supply companies in the region to get better knowledge about cost effectiveness of conducted services.

Taking into account that population increase by 20% in ongoing water supply and sanitation systems improvement programs and also tariff reforms (increase of waste water service tariff differentiation and etc) one can assess that total cost of supplied water and sanitation services will be around 30 Mln AZN annually.
There is no concrete figure about real spending by Azersu annually in the region and this work can also be carried to have more clear idea about cost effectiveness of work carried in the region

8.2.2 Economic assessment of irrigation water use services

Currently State owned Amelioration and Water Farm JSC is responsible for country wide irrigation water management, including the Central Kura pilot region. In total by JSC was supplied for irrigation use 842.1 mln. m^3 of water which is over 90% of the total abstracted waters(877,4 mln. m^3). Considering that about 35% of abstracted for use in agriculture waters are lost it can be noted that total volume of water used in agriculture can be considered to be around 570 mln. m^3.

Currently tariffs for water supply services for population is 0.5 AZN per 1000 m^3 of supplied to Water User Associations, which in turn cells water to individual farmers for the price of 2 AZN per 1000 m^3

Then total payment for irrigation water supply services at level water losses from irrigation system equal to 35% can be calculated as :

- For irrigation water sold by JSC to WUAs: 570000 *0.50 AZN= 285000 AZN
- For irrigation water sold by WUAs to farmers: 570000 *2. AZN= 1.14 Mln AZN

Many international donor funded project reports (particularly by World Bank, Asian Development Bank, etc.) show however that real cost of irrigation services is very high compared to current one. Today government is donating to agriculture, therefore this prices are very low to support the agriculture development in the country. For example more reliable cost for irrigation water supply services based above reports can be considered for water sold by Amelioration JSC to WUAs: 10 AZN per 1000 m^3 and for water sold by WUAs to farmers 15 AZN per 1000 m^3.

Based on these prices total payment for irrigation water supply services at level water losses from irrigation system equal to 35% can be calculated as :

- For irrigation water sold by JSC to WUAs: 570000 *10 AZN= 5.700.000 AZN
- For irrigation water sold by WUAs to farmers: 570000 *15. AZN= 8.550.000 AZN

Exact percentage of water losses can be even higher in some irrigation infrastructure and then the cost of services should be higher. Information for economic assessment of water use by rivers can be taken from the below table provided by Amelioration JSC for 2013.

Table 36 . Total water intake from rivers in 2013

№	Rivers	Irrigated area, thousand hectare	Admistrative region	Volume of water intake, mln. m^3	Volume of water use for irrigation, mln. m^3	Volume of water losses mln. m^3
1	Agstafachay	26.0	Gazakh	144.6	102.8	41.8
2	Hesensu	2.1	Gazakh	9.6	6.9	2.7
3	Akhincachay	8.7	Gadabay, Tovuz	56.4	35.2	21.1
4	Tovuzchay	2.3	Tovuz	35.0	25.1	10.1
5	Asrikchay	0.8	Tovuz	4.1	2.4	1.7
6	Zeyemchay	9.7	Gadabay, Tovuz	57.2	44.4	12.8
7	Ceyirchay	6.5	Gadabay, Shamkir	51.0	38.5	12.5
8	Shamkirchay	21.1	Gadabay, Shamkir	167.1	106.7	60.4
9	Goshqarchay	5.0	Dashkesen, Goygol, Ganja	20.3	9.7	10.6
10	Ganjachay	18.3	Goygol, Ganja Samukh	311	185.3	125.7

In order to increase of efficiency there is need to reduce water losses by improving status of irrigation infrastructure.

About 50% of the irrigation infrastructure is outdated, resulting in substantial conveyance and operational losses (World Bank, 2012; page 15). Upgrading and rehabilitation, coupled with improved management (including proper O&M) are needed to improve irrigation efficiencies and crop production.

The performance of the canal systems, however, has deteriorated significantly from many years of use and inadequate maintenance. Many main and secondary canals are unreliable for sustained operation.

Irrigation water deliveries to water users are insufficient to fully meet the crop irrigation requirements, resulting in very low crop yields compared to international standards.

The Azerbaijan Amelioration JSC should comprehensively assess the main system infrastructure and management, identifying priority opportunities to improve performance as a part of the preparation of an Irrigation Master Plan, followed by a physical upgrading program consistent with the findings of the assessment. With regard to the on-farm systems, Amelioration JSC should prioritize and package the systems remaining to be rehabilitated and transferred to the WUAs, such that the groupings identified are of interest to the various potential donors.

9. PUBLIC INFORMATION AND CONSULTATION

9.1. Legal framework for public information, consultation and participation in the Central Kura River Basin District

The Republic of Azerbaijan is looking for an enhanced cooperation with the European Union. The priority areas for cooperation have been agreed by the Government of Azerbaijan and the European Commission in the country Strategy Paper under the European Neighbourhood and Partnership Instrument. The mutually agreed EU/Azerbaijan Action Plan shows Azerbaijan's commitment to implement jointly agreed priorities in compliance with the international and European norms and principles. The plan identified priority actions for key environmental sectors including water management, where important role belong to public participation. In the European Union the most important piece of legislation covering protection of water environment is the Water Framework Directive and other directives.

The Law on the Environmental Protection establishes the rights of population (citizens, persons without citizenship and foreigners) in the area of environmental protection. The Law determines that the duties of public organizations consist of implementing their activities in line with the laws on environmental protection and public organizations.

An important part of this law is the section on supervision over environmental protection. It covers the implementation of public control. The law determines that the public control in environmental protection is exercised at the initiative of public organizations (NGOs) based on the contracts between users of nature and stakeholders. The rules to conduct public control are determined by NGOs in line with their charter.

Another important step towards public participation is that Azerbaijan joined to the Aarhus Convention in 1999. Based on the requirements stemming from the Convention, a local law on "Obtaining environmental information" was adopted in 2002. This law covers issues related to public participation.

According to the legislation system of Azerbaijan, the Conventions, to which Azerbaijan is a party, are directly applied in the country as an integral part of the national legislation

In June 2014 a law on public participation entered into force in Azerbaijan, maybe it should be also mentioned. (http://www.aalep.eu/law-republic-azerbaijan-public-participation-nascent-pro-bono-public-policy-advocacy)

9.2. Public participation, information, communication and public outreach activities carried out regarding the development of the RBMP in the Central Kura Basin District

In Azerbaijan there have been previous attempts to support public participation in river basin management, such as within the USAID South Caucasus Water Program in the frame of which a consultative group in Ganikh (Alazan) river basin was created to discuss process of development of Ganikh RBMP. Furthermore, meetings have been conducted in Central Kura River basin district by NGOIHPA by support of OSCE, which later was continued by EPIRB project.

Within the framework of the EPRIB project, a Communication Strategy and Plan was developed. (See http://blacksea-riverbasins.net/en/pilot-basins/central-kura-basin-ganjachay-shamkirchai-tovuzchay-agstafachay).

Based on this, various information, consultation, public participation measures and awareness building activities have been undertaken.

These include public information such as the development of technical public documents and general publications (e.g. Key Water Issues, In the Flow project newsletter etc.) and public consultation activities directly linked to the development of river basin management plan (RBMP).

9.3. Public consultation for the development of draft Central Kura Basin District RBMP

During the development of the RBMP the following public information and consultation measures were taken:

- Information was circulated on the draft and final Communication Strategy and Plan on the website of the project;
- Stakeholder consultation meeting was held on the significant water management issues document ("Pressures and Impact Analysis"), document published for comments in May 2014 at: (www.blacksea-riverbasins.net) ;
- Project newsletter "In the Flow" (6) and brochure on Significant Water Management Issues in Central Kura Basin District have been published and distributed among stakeholders as well as placed on the EPIRB project website (www.blacksea-riverbasins.net) ;
- The draft Central Kura Basin District RBMP entered the public consultation phase from April 24 2015 until August 31 2015, including a public consultation meeting and possibilities for submitting comments.

The opportunity to participate in the consultations was promoted by: direct notification mass-emails; relevant NGO networks; news items on the EPIRB project website (www.blacksea-riverbasins.net); the regularly published project newsletter "In the Flow", and targeted media announcements (e.g. www.ganjanews.az, local newspaper etc.).

The stakeholder consultation meeting on the significant water management issues was held in Baku on 2 September 2014. It targeted water practitioners, different key stakeholders from different sectors etc. It had the main aim to present the necessary background information and the preliminary overview of the important water management issues for the river basin, as well as to collect stakeholders' feedbacks concerning the identification of the most important water management issues. The summary of the discussions can be accessed on the EPIRB project website at: (www.blacksea-riverbasins.net).

The public consultation meeting "Shaping the future of the Central Kura Basin District" was held in Ganja city on 23 April 2015. It had the main objectives to present the draft RBMP and the planned Programme of Measures, and to discuss and receive feedback, comments and proposals on the draft RBMP, including the planned measures. The meeting gathered 35 participants, representing a broad range of stakeholders such as: relevant state water management organizations, joint stock companies, representatives of water users, municipalities and NGOs. The one day event gave short introduction to the draft RBMP, as well as provided opportunity for feedback and comments through interactive discussion organized within two working groups. The group discussions were guided by independent facilitators, and the outcomes of the discussions were shared

in the plenary session by selected rapporteur. The minutes of the meeting can be accessed on the EPIRB project website at: (www.blacksea-riverbasins.net).

After the public consultation meeting article was published in local Newspaper in Ganja and summary of discussions of the meeting has been broadcasted by Kapaz TV of Ganja city. Short film was produced about the meeting and distributed in DVD format among stakeholders as well as among students in Baku State University.

Besides the public consultation meeting, opportunity to submit written comments to the draft RBMP was open until 31 August 2015. A total of 5 written comments were received.

All the comments requesting changes to the draft RBMP received during the consultation meeting(s), as well as in written form have been collected and processed by the consultants developing the RBMP in close cooperation with the Ministry of Ecology and Natural Resources of Azerbaijan Republic. In order to ensure transparency a summary report has been prepared which gives an overview on the original comments received and the responses and actions taken, whether it resulted in changes in the draft RBMP etc. The summary report can be found at: (www.blacksea-riverbasins.net) and is given in Annex 22.

10. COMPETENT AUTHORITIES

The Ministry of Ecology and Natural Resources of Azerbaijan Republic is main beneficiary organization in Azerbaijan who will approve the developed RBMP. Therefore the ministry is responsible state body on implementation of water resources related policy in Azerbaijan, including development and implementation of RBMP.. By leadership of ministry different related organizations in Azerbaijan and group of experts actively participated in the development of draft of rivers basins managements plan.

In accordance with article 16 of the Water Code of the Republic of Azerbaijan basin approach can be applied in the process of water management of the country. Regional branch of MENR in Gazakh district can take leadership in implementation of Central Kura RBMP after it gets approval from government.

11. CONTACT POINTS

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12. EBIRB PILOT PROJECTS

In Chapter 6 have been identified basic and supplementary Programm of Measures to be implemented in Central Kura river Basin District to help implementation of RBMP according to EU and National legislations. In total in that chapter have been identified 16 basic and 15 supplementary measures are given in Annexes 8 and 9 accordingly. In parallel to this for 15 WBR and 5 WBPR have been identified concrete measures to achieve environmental objectives according to requirements of EU WFD and are given in Annexes 5 and 6accordingly.

After prioritization of PoM according to economical, social and environmental criteria has been selected 8 priority basic measures (Annex 3) and 9 priority supplementary measures (Annex 6) .

Some priority measures have been supported by EPIRB project during 2014-2015 years. İmplemented 6 new pilot projects are described in Annex 21 .

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ANNEXES

Annex 1. Basic measures of the Programme of measures to the Central Kura BD

EU legal act	Measures	Lead organizations	Period
1.EU WFD	**EU WFD application** In order to implement article 15 of Azerbaijan Water Code it is necessary to develop mechanism on application of basin approach according to WFD. Main objectives to be addressed: -Develop mechanism(national regulatin) how WFD compliance RBMP can be developed in Azerbaijan -Develop scheme on division of territory of Azerbaijan to basin districts -Identify needed insritutional reforms to apply IWRM and RBMP according to EU legislation Initial draft of document addresseing above issues is prepared by support of EPIRB project and will be submitted to Government for approval.	MENR, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)
2.Directive 91/271/EEC on urban waste water treatment (UWWT)	**Adoption of existing legal institutional framework to apply UWWT directive** Main work needed to be carried should cover: - Assessment of Technical and Operational Characteristics of Existing, constructed and planned Wastewater Treatment Facilities according to UWWTD provisions . and recommend proposals on compliance - Improvement of Waste water Discharge Permit system in accordance with EU Directives and ,make sure that all facilities falling under Directive 91/271/EEC have permits and report on their waste water disposal. - Stricter discharge limits for specified parameters for specific installations. -Tighter controls and suitable incentives for compliance with the provisionsof permits in industries of Article 13 of Directive 91/271/EEC. _ Preparation of aquifer quality monitoring program in areas irrigated with recycled water.	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)

EU legal act	Measures	Lead organizations	Period
	-Harmonisation of legal-regulatory framework according to the directive, and its provisions		
3.Directives 76/160/EEC and 2006/7/EC "on the management of bathing water quality"	**Develop regulationon on application of Directives 76/160/EEC and 2006/7/EC "on the management of bathing water quality"** Main areas to be addressed: -Identifivation of legal and institutional settings to apply above directives -Investigation of the impact of stormwater runoff disposal and of other wastes through the drainage pipes to bathing water and finding sustainable ways of its mitigation. -Investigation of the tendency to develop algae and / or marine phytoplankton and determination of appropriate management measures.	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)
4.Directive 91/676/EEC on the protection of waters from nitrate pollution from agricultural sources	Develop mechanism on application of **Directive 91/676/EEC on the protection of waters from nitrate pollution from agricultural sources** Main areas to be addressed in prepared mechanism will be: -Creation of relevant legal and institutional framework for **protection of waters from nitrate pollution from agricultural sources according to the Directive** and development of relevant action plan - Institution of economic incentives for the modernization and improvement of livestock infrastructure facilities within SPAs. -Provision for penalties in the Action Plan to reduce and prevent nitrate pollution. - Support of training/ information /awareness program and use of economic incentives on the Action Plan to reduce and prevent nitrate pollution. -Creation of Monitoring Committee for the Action Program to reduce and prevent nitrate pollution -Adopt codes of best agricultural practices and programs to	MENR, MoH, MoA Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)

EU legal act	Measures	Lead organizations	Period
	facilitate the implementation of these codes.		
5. **Directive 98/83/EC on the quality of drinking water**	**Measure in relation to Directive 98/83/EC on the quality of drinking water** Main acrivities: • Implementation of Water Supply Waste Water Law and other regulations and development of other legal acts which allow to apply Drinking Water Directive principles. • In parallel to provision of good quality drinking water to city centers in the pilot region within ongoing IFIs supported National Water Supply and Sanitation projects there is need to implement projects on improvement of drinking water supply in large settlements. • Implementation of projects on identification of sources of water fitting drinking water requirements and determination of their yields for consumption. • Develop and implement drinking water quality monitoring in residential areas. • Reformation of the legal framework governing the opening and operation of drinking water boreholes • Identification of the necessary technical measures for the proper chlorination of water which is destined for human consumption	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)
6.Directive 96/61/EC on integrated pollution prevention and control	Develop secondary legislation on compliance with **Directive 96/61/EC on integrated pollution prevention and control** **Main activities to be carried:** • Identification of needed legislative regulatory framework to apply directive • Develop system on regular control of the provisions of Waste Discharge Permits (WDP) by priority in IPPC units.	MENR, MoH Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)

EU legal act	Measures	Lead organizations	Period
	• Regulation establishing the permissible thresholds in the treated livestock waste and on the criteria for disposing them to the ground.		
7.Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora	Develop secondary legislation on compliance with **Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora** **Main activities to be carried:** • Creation of relevant legal and institutional framework according to Directive requirements, to protect habitats. • Application of provisions relating to water resources referred to in management plans of Directive 92/43/EEC • Rule on application of Minimum Residual Flows (MRF) downstream of dams . .	MENR, MoH Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)
8.Directive 2007/60/EC on the assessment and management of flood risk	Develop secondary legislation on compliance with **Directive 2007/60/EC on the assessment and management of flood risk** **Main activities to be carried:** • Creation of relevant legal and institutional framework according to Directive requirements, for preparedness, predicting and , preventing of floods • Development of flood early warning system • Revision of the existing Development Plans, where necessary. • Development of a delineation methodology for zoning riparian areas and the delineating areas with potential flood risk taking into account Directive 2007/60/EC. • Specific study on the implementation of this Directive.	MENR, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First planning circle(2015 --2021)

EU legal act	Measures	Lead organizations	Period
	• Implementation and update of guidelines for the design and management of riparian areas and the criteria for interventions in rivers with emphasis on the review of existing uses and the regulation of land use in flood areas.		
9. Measures on pricing policy	**Measures on pricing policy** The "basic measure" includes measures that are appropriate for the purposes of Article 9 of W.F.D where taking into account the principle of cost recovery for water services, including environmental and resource costs, according to the principle "polluter pays" It is necessary to develop regulations that ensure: • that water-pricing policies provide adequate incentives for users to use water resources efficiently and thereby contribute to the achievement of environmental goals W.F.D., • adequate contribution of the various water uses, disaggregated at least into industry, households and agriculture, to recover the costs of water • services identify social, environmental and economic effects of recovery. The proposed measures to implement the principle of cost recovery of water use are summarized as follows: • Application of an appropriate pricing policy. • Provision for establishing an over consumption fee (Quota) in the pricing policies to be implemented. • Recommendation of a central mechanism for the collection and use of environmental costs and resource costs (Water Fund). The Fund should finance biodiversity protection actions. • Configuration of a detailed water balance for all categories of water .	MENR, Tariff Committee, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First planning circle(2015--2021)
10.Measures on priority substances	To develop mechanism to prevent pollution with priority substances according to Strategy against pollution of water ispecified in Article 16 of W.F.D.,	MENR, MoH Water Resources State	First and second planning circle(2015

EU legal act	Measures	Lead organizations	Period
(Article 16)	Main activities • Identify a list of priority substances and a process for identifying priority substances/hazardous priority substances and undertake of specific measures against pollution by these substances • Develop special measures for the progressive reduction of discharges, emissions and losses of "priority substances" and the cessation or gradual elimination of emissions, discharges and losses of "priority hazardous substances". • Develop relevant legal and institutional framework that provide application of the relevant current EU legislative framework against chemical pollution of waters from priority substances which includimg: **1. Directive 76/464/EEC** on pollution caused by certain dangerous substances discharged into the aquatic environment of the community, as codified by **Directive 2006/11/EC** **2. 2455/2001/EEC Decision** establishing the list of priority substances in water policy and amendment of Directive 2000/60/EC. **3. Directive 2008/105/EC** on Environmental Quality Standards. Conduct study how The Directive can be transposed into national law **4. Directive 2009/90/EC** on establishing technical standards for chemical analysis and monitoring of water status in accordance with Directive 2000/60/EC. Study how the Directive can be transposed into national law Legal and institutional framework should require for industrial facilities which discharge substances in List I or II of Directive 2006/11/EC to have permits. Moreover, threshold values for waste water disposal of industrial plants should be established, according to Directive 76/464/EEC and its subsidiaries.	Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	--2027)
11. Measures to prevent or to reduce the impact of	Development of Measures to **prevent or to reduce the impact of accidental pollution incidents.** **Main objectives:**	MENR, MoH Water Resources State	First – second planning circle(2015

EU legal act	Measures	Lead organizations	Period
accidental pollution incidents	• identify measures to prevent pollution by significant pollutants leaks from technical installations and prevention and/or reduction of the impact of accidental pollution incidents • under the national institutional framework implement measure to prevent impact of accident or extreme natural phenomena for installations covered by the provisions of IPPC Directive	Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	--2027)
12.Control of abstraction and impoundment of water, including reference to the registries and data of the cases where exemptions have been provided under Article 11 (3) (e)	Control of abstraction and impoundment of water Unde this measure there is need to develop authorization system for extraction from surface water through: • License for an impoundment project for diversion, obstruction or hindering of surface water flow • License for an impoundment project for diversion, obstruction or hindering of surface water flow License for Water abstraction project • License for Water abstraction For ground waters there is need to develop procedure: • For authorization and supervision of drilling and extraction of ground or surface water • Licensing of boreholes , including cost of license issuing and fines for non compliance	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First planning circle(2015 --2021)
13.Measures for Point Source Discharges liable to cause pollution (Article 11 (3)(g)	Measures to combat pollution with point source discharges This PoM will include pollution prevention activites by below secors I**ndustry** Preparation of a registry for mining and industrial facilities , which will be designed appropriately to incorporate accurate information on the quantities of water used (for industry), the quantitative and qualitative data, their waste and ways to manage them. • *Waste discharge permits (WDP)for all industrial*	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts	First and second planning circle(2015 --2027)

EU legal act	Measures	Lead organizations	Period
	installations • *Finalization of the objectives of the time schedule and the cost elements for the rehabilitation of the inactive mines* • *Preparation of an overall techno economic - environmental remediation study of the contaminated area* • *Systematic and continuous monitoring of compliance of industrial units with the WDPs* **Animal breeding units :** • Building / Upgrading / Extension / Rehabilitation of WWTP (even tertiary step and disinfection for discharges into water resources); • Building / / Impermeabilizing of storage reservoirs for waste waters / treated waste water and using them for washing and/or irrigation; • Building/rehabilitation of sludge storage platforms from WWTP; • Building platforms for manure storage (dry manure system) for application during indicated periods; • Application of existing BATs under requirments of IPPC Directive.	and others	
14.Measures for Diffuse discharges source liable to cause pollution	Measures to combat with pollution by diffuse sources These PoM will consider implementation of below activities: .Develop mechanism for compliance with the provisions of Directives 91/271/EEC, 91/676/EEC, 86/278/EEC and 96/61/EC and the relevant laws of the Republic • Prepare of mechanism to provide the safe wastewater disposal issue of small settlements from an environmental standpoint. Proposal for improved management of the extraction, transport and disposal of sewage. • Review of specific W.D.P. livestock facilities. • Intensification of compliance controls of livestock	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)

EU legal act	Measures	Lead organizations	Period
	facilities with the provisions of W.D.P-Application of specific action plans for each commune located in the vulnerable areas (including the Good Agriculture Practices); • educing the risk from handling and stocking of pesticides; • rovisions for authorizing, notification, homologation and other measures for handling of pesticides.		
15.Measures taken under Article 11 (5) for water bodies which are **unlikely to achieve environmental objectives under Article 4**	**Measures for water bodies which are** **unlikely to achieve environmental objectives under Article 4** Main activities: • to investigate the causes of possible failure, • to consider the relevant permits and authorizations which have to be revised as many times as considered appropriate, • to review and adjust monitoring programs as many times as appropriate and to set additional measures needed to achieve these objectives, including, when appropriate, stricter environmental standards in accordance with the procedures laid down in Annex V . When these causes are due to circumstances arising from natural causes or force majeure and are exceptional or could not have reasonably been foreseen, in particular extreme floods and prolonged droughts, it may be decided that additional measures are not practicable, notwithstanding Article 4(6). Within the above, additional steps have been foreseen. Related measures concern the following: • Development of a distributed rainfall runoff model coupled with nutrient/ • pollutants transport modeling at RBD level • Implementation of a program investigating the	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First, second and third planning circle(2015 --2033)

EU legal act	Measures	Lead organizations	Period
	river basins with uncertain sources of pollutants • Update of the monitoring program • Special ad hoc monitoring program of water bodies with high uncertainty in their classification		
16.Measures Promoting the Efficient and Sustainable Water Use	**PoM to achieve** sustainable use of water resources Main actions should be launched: • Preparation of a regulations on cultivation restructuring. • Promoting water saving technologies in industry • Preparation of uniform framework of conditions and specifications for use by the competent authorities, aiming to implement an integrated policy of sustainable management of storm water • Develop and Implement requirements to manage storm water at residence level • Implementation of a feasibility study in collaboration with other institutes for the construction of permeable paving, road surfaces and sidewalks. • Elaboration of a study for the Sustainable Rain Water Management. • Implementation of the Projects for recycled water use which were proposed by WDD • Update and co-evaluation with the competent authorities for the ability of provision of basic drainage services, before final decision making on extending or establishing development zones.	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	First and second planning circle(2015 --2027)

ANNEX 2. Supplementary measures of the Programme of measures to the Central Kura BD

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
1.Admiistrative measure: Creation of BMO and RBC	Creation of BMO and RBC Main activities: • To develop proposal on possible options and cost of creation and maintenance of basin entity in the Central Kura River Basin District. • To develop proposal on needed legislative adjustments for implementation of RBMP • To develop actions on stepwise approach required for implementation of RBMP according to EU WFDTo cooperate with other relevant regional divisions of MENR and also Water Resources State Agency Azersy, Amelioration JSC and other relevant organization to provide basin wide integrated water use and management.	MENR Water Resources MENR, MoH, MoA, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First planning circle(2016--2021)
2. Provision of efficiency Water Supply and Sewage system management at rayon centers	**Provision of efficiency Water Supply and Sewage system management at rayon centers** Main activities: • Develop system of monitoring and control of compliance of newly created WSSS meet international standards in relation to the quality of drinking water and treated waste water(befor its use or discharge) • Develop action plans for WSSS which doesn't meet international standards to be in full compliance with them • Develop mechanism for management of treated waste fromwaste water treatment	MENR Azersu JSC, Local authorities and basin organizations in basin districts and others	Main rayon Centers in Central Kura	First planning circle(2016--2021)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	facilities			
3. Provision of efficiency Water Supply and Sewage systemfor large settlements at district level	Provision of efficiency Water Supply and Sewage systemfor large settlements at district level Main activities: • To identify sources of drinking water for secondary settlements and construct centralized water supply systems where it is economically feasible. • To prepare proposal on the sewage systems(connection to eisting or creation of new) The sewerage works have high construction, and operating costs, in cases of communities with low population density or in isolated communities where connection seems unfeasible. Therefore, the construction and operation of the projects presents many difficulties when it is undertaken by the small settlement level branch on sewage management given the lack of technical and organizational infrastructure. There will be need to develop options on construction of common treatment facilities between rural settlements, as well as identification of suburban areas needed to be joined to the relevant administrative sewage systems at rayon level and share with them the existing infrastructure	MENR Azersu JSC, Local authorities and basin organizations in basin districts and others	Large settlements in Central Kura	First and second planning circle(2015--2027)
4. Economic	**Economic and fiscal measures** Main activities will be to develop needed	MENR, MoH Water	To be identified	First planning

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
and fiscal measures	supplementary measures aimed in strengthening of cooperation with relevant regional divisions of Amelioration JSC to promote the rational management of the irrigation water based on criteria of economic efficiency, environmental sustainability and equality, including : • Establishment of the "Water Fund" • Subsidies for reduced use of irrigation water • Awareness campaigns for the rural population • Provision of penalties / fines for over abstraction • Establishment of system of water abstraction management to control of fulfillment of environmental flow requirements • Apart from the above the system of tradable permits can also be examined, Project is proposed to be implemented in the Central Kura River Basin District during 2019-2020 MENR can involve to the project Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	within the Central Kura pilot area.	circle(2016--2021)
5.Negotiated environmental agreement	**Negotiated environmental agreements** Main activities: • Identify areas where voluntary agreements between government authorities and one or more private parties need to be conducted to achieve environmental objectives. • Develop menchanism that ancourage	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and	To be identified within the Central Kura pilot area.	First and second planning circle(2016--2027)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	participation in such control programs through the use of positive incentives. • Develop system to negotiate on compensation payments.when the costs and benefits are not evenly distributed between the parties An important advantage of environmental agreements is the widespread social acceptance as they relate to a voluntary scheme. The implementation of such programs is proposed to be considered at the next management cycle.	basin organizations in basin districts and others		
6.Emissions control	**Emissions control** Main activities to develop emission control measures in the Central Kura River Basin District are: • Develop provisions on possible emission control measures to strengthenthe pollution control in the basin. Develop system of a combined approach on the reduction of pollution at source by setting emission limit values and set targets for water quality in different water bodies. When establishing the emission limit values should be provided relevance with EU and national law, and among other directives, with the Directive on Integrated Pollution Prevention and Control (IPPC) and the Directive on urban wastewater treatment. Provisions to increase the capacity of relevant authorities in the basin district to have adequate legal powers and resources to: a. Identify and monitor all kinds of discharges in the basin b. issue permits for discharges and enforce the terms of licenses and control compliance with the provisions of the waste water discharge permits c. take measures to prevent pollution either by	MENR, MoH Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First and second planning circle(2016--2021)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	the imposition of protection zones or through control of activities which could have adverse effects on water status. d. implement supplementary measures for those specific circumstances where Environmental Quality Standards are not met, despite the application of limit values that are specified in the basic measures.			
7. Codes of good practice	**Codes of good practice** Main activities: Develop mechanism to apply the Code of Good Agricultural Practice (G.A.P.) in compliance with Directive 91/676/EEC concerning the protection of waters by nitrates from agricultural sources and also in compliance with natioal legislation . farming. Develop provisions to inform and help all those engaged in agriculture and livestock to avoid or limit environmental pollution when using fertilizers and livestock wastes and determine environmentally acceptable conditions for the use of recycled water and sludge for agricultural purposes, derived from treatment of urban waste. Develop system that allows to apply G.A.P. concerning the territorial scope of implementation and also provisions relating to crop rotation, plant protection products, the management of flora and the protected areas. Establish a Code of Good Practice in relation to the use of plant protection products where high concentrations of active substances of plant protection products are detected it is necessary	MENR, MoA Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First and second planning circle(2016--2027)
8. Demand management	**Demand management measure** Main activities: Develop demand management system based on	MENR, MoH, MoA Water	To be identified within the Central	First - third planning circle(20

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
measures	which include measures related financial, communicational, legislative and administrative, and technological aspects ofsustainable use of water. Develop recommendations will be to raise public awareness on issues of water resources management**.** Particularly for domestic use, public awareness activities will concern: _ organizing awareness weeks with presentations and related workshops of updating _ the distribution of a free calendar and timetable for schools with a cover that indicates the seriousness of the situation _ distribution of brochures and leaflets with useful advice and suggestions for the potential saving of water at the domestic level • Development of brochures and leaflets for raising awareness among farmers in terms of saving irrigation water , incentives to reduce intensive farming, the rational use of fertilizers, protection of farmland and overall rational management of water resources (adequate irrigation practices, reduction of pumping, construction of drainage works). • Develop recommendation on giving focuses not only on the use of all surface water sources that are available, but also on the use of alternative water sources such as recycled for crop irrigation in agriculture, and the recharge of groundwater aquifers. • Prepare system of informing water users and the public about the current conditions of water balance and the necessity of the various measures that are enforced each time.	Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	Kura pilot area.	16--2021)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
9. Efficiency and reuse measures	**Efficiency and reuse measures** Main activities are: Develop recommendations on eddiciency use of water and also reuse of treated waste waters Develop a subsidy program to reduce use of drinking water in other purposes which includes a: _ **Subsidy for the drilling of wells**: Refers to the drilling of boreholes, for garden irrigation _ **Subsidy for connecting wells with lavatories**: The subsidy covers connecting wells to homes', schools', offices', shops', institutions' latrines, etc. which are connected to the water board systems. _ **Subsidy for installation of grey water recycling system**: The purpose of installing such a system is procession of grey water and reuse for irrigation of gardens or in toilets of the premises from which the grey waters come from. _ **Subsidy for installation of hot water pump in residences** Adopt policy guidelines for the rational and sustainable use of water as they are basically reflected in the Management Plan. Develop awareness programs with residents and organizations related to the concern that increasing of water scarcity by **deforestation and unrestrained urban and tourist development** . This programs also should be oriented to the competent authorities who should take into account the concerns about water resources in their land use planning, especially in relation to the development of economic activities in sensitive river basins. To develop recommendations on use of water saving	MENR, MoH Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First-third planning circle(2016--2021)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	technology, sharing of good practice and innovation that lead to less water consumption, aiming at improved efficiency in water management. For swimming pools an appropriate fee should be established. Water losses due to leakages in public water supply networks should be limited. Towards this end central flowmeters should be installed in The water performance criteria should, where possible, become part of construction standards for buildings. In this context proposals include: _ Compilation of a Guidance Document on the creation of gardens with low irrigation water requirements in dev-elopments and _ Compilation of a Guidance Document on specifications and codes regarding the equipment of new buildings with low water consumption appliances. The installation of these devices should be mandatory in all government buildings.			
10.Projects of Infrastructure Rehabilitation	**Infrastructure Rehabilitation** This measure includes: -Rehabilitation of existing and Construction of new reservoirs and canals to ensure efficiency irrigation water supply and provide environmental flow requirements in downstream parts of rivers -Rehabilitation of existing and Construction of new Water Supply and Sanitation System -Construction of drainage to collect irrigation water and its treatmen	MENR, Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First - third planning circle(2016--2021)
11.Restoration of the continuity of the water flow	The study will identify: • Measures of provision of normal functioning and construction of new fish breeders • Measures to improve the ecological	MENR, Water Resources State Agency, Azersu JSC,	To be identified within the Central Kura pilot	First - third planning circle(2016--

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	condition of the river beds • Measures for greening and planting trees near rivers and lake • Measures on river bank protection • Environmental flow requirements •	Local authorities and basin organizations in basin districts and others	area.	2021)
12.Use of treated waste water	**Use of treated waste water** Main activities are: • Develop proposal on state of treatment of waste waters currently in newly rehabilitated (under rehabilitation) waste water treatment plants of rayon centers in the basin • If necessary propose different new treatment options, such as use of reverse osmosis units and other methods. The process of reverse osmosis produces water without limitations on usage, allowing integrated management of every source of irrigation water. • Conduct soil study to determine the required limits for the application of recycled water for irrigation, • Develop recommendations on use of recycled water as a resource r for irrigation or other purposes • To identify ways needed to work towards increasing the acceptance of using recycled water. Project is proposed to be implemented in the Central Kura River Basin District during 2019-2020 MENR can involve to the project Water Resources State Agency, Amelioration JSC, MoH, Azersu JSC,	MENR, MoH, MoA Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First - third planning circle(2016--2021)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	Local authorities and basin organizations in basin districts and others			
13.Artificial recharge of aquifers	Artificial recharge of aquifers Main activities are: • To identify areas where there is need for artificial recharge of aquifies and determine the required measures to construct the recharge dams, some recharge / diversion stream intakes in streams • To evaluate needs to create the strategic reserves in aquifers as a part of artificial recharge policy . In general, the majority of the groundwater bodies are in good quantitative status. Thus it is important to propose measures • to restore them to sustainable levels. • Develop measures related to the artificial recharge of aquifers, including: • Development of the monitoring program of the recharged aquifers • Implementation of a hydrogeological study in the broader area of recharge • Develop of model of groundwater drainage in • the pilot area through the simulation of quality and movement of ground water for the development and evaluation of scenarios of recharge. • Implementation of an updated study for the disposal of recycled water for aquifer recharge. • Technical and environmental investigation of the possibilities for building small river	MENR, MoA, MoH, Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First - third planning circle(2016--2033)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	intakes for groundwater recharge			
14. E**ducational measures**	E**ducational measures** Main activities are: ATo develop recommendations on possible educational measures aimed at creating water awareness in schools and the wider public and among users,, including: • Further strengthening of the measures on water awareness in Primary Education • Creation of a Web site promoting water consciousness • Educational programs for farmers • Regular meetings of basin organizations with mayors and community councils in small groups • Information and awareness guide in relation to pollution issues derived from activities in the primary sector 6. Educational programs for the public • Training and specialization of the personnel responsible for monitoring of ground water and data management • Campaign raising awareness on the management of rainwater	MENR, MoEd, MoH, MoA Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	First - third planning circle(2016--2021)
15. **Monitoring , classification systems and Research**	**Monitoring , classification systems and Research** Main activities are: • Determining of reference conditions for classification of WBs.	MENR, NAS, MoH, MoA, Water Resources State Agency, Azersu JSC, Local authorities	Within the Central Kura pilot area.	First - third planning circle(2016--2021)

Measure	Actions	Lead organizations	Applied areas	Deadline
Supplementary measures				
	• Development of Monitoring program and an Assessment of Qualitative Data System (Annex V of the WFD) • Develop the ecological status assessment sytem of RWBs based on the monitoringof biological parameters(- macroinvertebrates and phytobenthos and etc) • To initiate the processes of development of valuation systems for the following biological quality and hydromorphological quality elements: • Hydromorphological parameters • Macrophytes • Benthic invertebrates in rivers with non-continuous flow • Fishfauna • For a safe assessment of the status of all water bodies develop proposal on upgrading of existing monitoring network of WBs in pilot area • Setting of WFD compliant water quality standards and classification system	and basin organizations in basin districts and others		

Annex 3 . Selected 8 Priority Basic measures for Central Kura BD to be implemented in first planning period

EU legal act	Measures	Lead organizations	Period	Budget Euro

EU legal act	Measures	Lead organizations	Period	Budget Euro
1.EU WFD Implementation in Central Kura pilot area	.**EU WFD Implementation in Central Kura pilot area** In order to implement article 15 of Azerbaijan Water Code it is necessary to develop mechanism on application of basin approach according to WFD. Main objectives to be addressed: -Develop mechanism(national regulatin) how WFD compliance RBMP can be developed in Azerbaijan -Develop scheme on division of territory of Azerbaijan to basin districts -Identify needed insritutional reforms to apply IWRM and RBMP according to EU legislation Initial draft of document addreseinf issues are prepared by support of EPIRB project and will be submitted to Government for approval.	MENR, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	2016	35000
2.Directive 91/271/EEC on urban waste water treatment (UWWT)	Adoption of existing legal institutional framework to apply UWWT directive Main work needed to be carried should cover: • Assessment of Technical and Operational Characteristics of Existing, constructed and planned Wastewater Treatment Facilities according to UWWTD provisions . and recommend proposals on compliance • Improvement of Waste water Discharge Permit system in accordance with EU Directives and ,make sure that all facilities falling under Directive 91/271/EEC have permits and report on their waste water disposal. • Stricter discharge limits for specified parameters for specific installations. • Tighter controls and suitable incentives for compliance with the provisionsof permits in industries of Article 13 of Directive 91/271/EEC.	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	2016-2017	70000

EU legal act	Measures	Lead organizations	Period	Budget Euro
	• Preparation of aquifer quality monitoring program in areas irrigated with recycled water. • Harmonisation of legal-regulatory framework according to the directive, and its provisions			
5. **Directive 98/83/EC on the quality of drinking water**	**Directive 98/83/EC on the quality of drinking water** **Main activities:** • Implementation of Water Supply and Waste Water Law and other regulations and development of other legal acts which allow to apply Drinking Water Directive principles. • In parallel to provision of good quality drinking water to city centers in the pilot region within ongoing IFIs supported National Water Supply and Sanitation projects there is need to implement projects on improvement of drinking water supply in large settlements. • Implementation of projects on identification of sources of water fitting drinking water requirements and determination of their yields for consumption. • Develop and implement drinking water quality monitoring in residential areas. • Reformation of the legal framework governing the opening and operation of drinking water boreholes • Identification of the necessary technical measures for the proper chlorination of water which is destined for human consumption	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	2016-2017	70000

EU legal act	Measures	Lead organizations	Period	Budget Euro
8.Directive 2007/60/EC on the assessment and management of flood risk	Develop secondary legislation on compliance with **Directive 2007/60/EC on the assessment and management of flood risk** **Main activities to be carried:** • Creation of relevant legal and institutional framework according to Directive requirements, for preparedness, predicting and , preventing of floods • Development of flood early warning system • Revision of the existing Development Plans, where necessary. • Development of a delineation methodology for zoning riparian areas and the delineating areas with potential flood risk taking into account Directive 2007/60/EC. • Specific study on the implementation of this Directive. • Implementation and update of guidelines for the design and management of riparian areas and the criteria for interventions in rivers with emphasis on the review of existing uses and the regulation of land use in flood areas.	MENR, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	2016-2017	55000
9. Measures on pricing policy	The "basic measure" includes measures that are appropriate for the purposes of Article 9 of W.F.D where taking into account the principle of cost recovery for water services, including environmental and resource costs, according to the principle "polluter pays" It is necessary to develop regulations that ensure: • that water-pricing policies provide adequate incentives for users to use water resources efficiently and thereby contribute to the achievement of environmental goals of W.F.D., • adequate contribution of the various water	MENR, Tariff Committee, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	2018-2019	45000

EU legal act	Measures	Lead organizations	Period	Budget Euro
	uses, disaggregated at least into industry, households and agriculture, to recover the costs of water services • identify social, environmental and economic effects of recovery. The proposed measures to implement the principle of cost recovery of water use are summarized as follows: • Application of an appropriate pricing policy. • Provision for establishing an over consumption fee (Quota) in the pricing policies to be implemented. • Recommendation of a central mechanism for the collection and use of environmental costs and resource costs (Water Fund). The Fund should finance biodiversity protection actions. • Configuration of a detailed water balance for all categories of water .			
12.Control of abstraction and impoundment of water, including reference to the registries and data of the cases where	**Control of abstraction and impoundment of water** Unde this measure there is need to develop authorization system for extraction from surface water through: • License for an impoundment project for diversion, obstruction or hindering of surface water flow • • License for an impoundment project for diversion, obstruction or hindering of surface water flow • • License for Water abstraction project • License for Water abstraction	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	2018-2020	43000

EU legal act	Measures	Lead organizations	Period	Budget Euro
exemptions have been provided under Article 11 (3) (e)	For ground waters there is need to develop procedure: • for authorization and supervision of drilling and extraction of ground or surface water • Licensing of boreholes , including cost of license issuing and fines for non compliance			
15.Measures taken under Article 11 (5) for water bodies which are unlikely to achieve environmental objectives under Article 4	**Measures for water bodies which are unlikely to achieve environmental objectives under Article 4** Main activities: • to investigate the causes of possible failure, • to consider the relevant permits and authorizations which have to be revised as many times as considered appropriate, • to review and adjust monitoring programs as many times as appropriate and to set additional measures needed to achieve these objectives, including, when appropriate, stricter environmental standards in accordance with the procedures laid down in Annex V . When these causes are due to circumstances arising from natural causes or force majeure and are exceptional or could not have reasonably been foreseen, in particular extreme floods and prolonged droughts, it may be decided that additional measures are not practicable, notwithstanding Article 4(6). Within the above, additional steps have been foreseen. Related measures concern the following: • Development of a distributed rainfall runoff model coupled with nutrient/ • pollutants transport modeling at RBD level • Implementation of a program investigating the river basins with uncertain sources of	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	2017-2020	55000

EU legal act	Measures	Lead organizations	Period	Budget Euro
	pollutants • Update of the monitoring program • Special ad hoc monitoring program of water bodies with high uncertainty in their classification			
16.Measures Promoting the Efficient and Sustainable Water Use	**Measures for water bodies which are unlikely to achieve environmental objectives under Article 4** Main activities: • to investigate the causes of possible failure, • to consider the relevant permits and authorizations which have to be revised as many times as considered appropriate, • to review and adjust monitoring programs as many times as appropriate and to set additional measures needed to achieve these objectives, including, when appropriate, stricter environmental standards in accordance with the procedures laid down in Annex V . When these causes are due to circumstances arising from natural causes or force majeure and are exceptional or could not have reasonably been foreseen, in particular extreme floods and prolonged droughts, it may be decided that additional measures are not practicable, notwithstanding Article 4(6). Within the above, additional steps have been foreseen. Related measures concern the following: • Development of a distributed rainfall runoff model coupled with nutrient pollutants transport modeling at RBD level • Implementation of a program investigating the river basins with uncertain sources of pollutants • Update of the monitoring program • Special ad hoc monitoring program of	MENR, MoH Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	(2016--2020)	60000

EU legal act	Measures	Lead organizations	Period	Budget Euro
	water bodies with high uncertainty in their classification			

Annex 4. Selected from the Programme of measures to the Central Kura pilot area 9-priority supplementary measures

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
1.Admiistrative measure: Creation of BMO and RBC	Creation of BMO and RBC Main activities: • To develop proposal on possible options and cost of creation and maintenance of basin entity in the Central Kura River Basin District. • To develop proposal on needed legislative adjustments for implementation of RBMP • To develop actions on stepwise approach required for implementation of RBMP according to EU WFDTo cooperate with other relevant regional divisions of MENR and also Water Resources State Agency Azersy, Amelioration JSC and other relevant organization to provide basin wide integrated water use and management.	MENR Water Resources MENR, MoH, MoA, Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	2016--2021	25000
3. Provision of efficiency	Provision of efficiency Water Supply and Sewage systemfor large settlements at district level	MENR Azersu JSC, Local	Large settlements in Central	2016-2021	50000

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
Water Supply and Sewage system management of large settlements at district level	Main activities: • To identify sources of drinking water for secondary settlements and construct centralized water supply systems where it is economically feasible. • To prepare proposal on the sewage systems(connection to eisting or creation of new) The sewerage works have high construction, and operating costs, in cases of communities with low population density or in isolated communities where connection seems unfeasible. Therefore, the construction and operation of the projects presents many difficulties when it is undertaken by the small settlement level branch on sewage management given the lack of technical and organizational infrastructure. There will be need to develop options on construction of common treatment facilities between rural settlements, as well as identification of suburban areas needed to be joined to the relevant administrative sewage systems at rayon level and share with them the existing infrastructure	authorities and basin organizations in basin districts and others	Kura		
4. Economic and fiscal measures	**Economic and fiscal measures** Main activities will be to develop needed supplementary measures aimed in strengthening of cooperation with relevant regional divisions of Amelioration JSC to promote the rational management of the irrigation water based on criteria of economic	MENR, MoH Water Resources State Agency, Ameliorati	Central Kura	2016-2021	40000

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
	efficiency, environmental sustainability and equality, including : • Establishment of the "Water Fund" • Subsidies for reduced use of irrigation water • Awareness campaigns for the rural population • Provision of penalties / fines for over abstraction • Establishment of system of water abstraction management to control of fulfillment of environmental flow requirements • Apart from the above the system of tradable permits can also be examined, Project is proposed to be implemented in the Central Kura River Basin District during 2019-2020 MENR can involve to the project Water Resources State Agency, Amelioration JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others	on JSC, Azersu JSC, Local authorities and basin organizations in basin districts and others			
6.Emissions control	**Emissions control** Main activities to develop emission control measures in the Central Kura River Basin District are: • Develop provisions on possible emission control measures to strengthenthe pollution control in the	MENR, MoH Water Resources State Agency, Azersu JSC, Local	Central Kura	2016-2021	45000

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
	basin. • Develop system of a combined approach on the reduction of pollution at source by setting emission limit values and set targets for water quality in different water bodies. • When establishing the emission limit values should be provided relevance with EU and national law, and among other directives, with the Directive on Integrated Pollution Prevention and Control (IPPC) and the Directive on urban wastewater treatment. • Provisions to increase the capacity of relevant authorities in the basin district to have adequate legal powers and resources to: a. Identify and monitor all kinds of discharges in the basin b. issue permits for discharges and enforce the terms of licenses and control compliance with the provisions of the waste water discharge permits c. take measures to prevent pollution either by the imposition of protection zones or through control of activities which could have adverse effects on water status. d. implement supplementary measures for those specific circumstances where Environmental Quality Standards are not met, despite the application of limit values that are specified in the basic measures.	authorities and basin organizations in basin districts and others			
8. Demand	**. Demand management measure**	MENR,	To be	2016-	45000

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
management measures	Main activities: • Develop demand management system based on which include measures related financial, communicational, legislative and administrative, and technological aspects ofsustainable use of water. • Develop recommendations that will raise public awareness on issues of water resources management**.** Particularly for domestic use, public awareness activities will concern: - organizing awareness weeks with presentations and related workshops of updating - the distribution of a free calendar and timetable for schools with a cover that indicates the seriousness of the situation - distribution of brochures and leaflets with useful advice and suggestions for the potential saving of water at the domestic level • Development of brochures and leaflets for raising awareness among farmers in terms of saving irrigation water , incentives to reduce intensive farming, the rational use of fertilizers, protection of farmland and overall rational management of water resources (adequate irrigation practices, reduction of pumping, construction of drainage works). • Develop recommendation on giving focuses not only on the use of all surface water sources that are	MoH, MoA Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	identified within the Central Kura pilot area.	2021	

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
	available, but also on the use of alternative water sources such as recycled for crop irrigation in agriculture, and the recharge of groundwater aquifers. • Prepare system of informing water users and the public about the current conditions of water balance and the necessity of the various measures that are enforced each time.				
11.Restoration of the continuity of the water flow	The study will identify: • Measures of provision of normal functioning and construction of new fish breeders • Measures to improve the ecological condition of the river beds • Measures for greening and planting trees near rivers and lake • Measures on river bank protection • Environmental flow requirements •	MENR, Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	To be identified within the Central Kura pilot area.	2027-2028	35000
12.Use of treated waste water	**Use of treated waste water** Main activities are: • Develop proposal on state of treatment of waste waters currently in newly rehabilitated (under rehabilitation) waste water treatment plants of rayon centers in the basin • If necessary propose different new treatment options, such as use of reverse osmosis units and other methods. The process of reverse osmosis produces water without limitations on usage, allowing	MENR, MoH, MoA Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts	To be identified within the Central Kura pilot area.	2016-2021	35000

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
	integrated management of every source of irrigation water. • Conduct soil study to determine the required limits for the application of recycled water for irrigation, • Develop recommendations on use of recycled water as a resource r for irrigation or other purposes • To identify ways needed to work towards increasing the acceptance of using recycled water. Project is proposed to be implemented in the Central Kura River Basin District during 2019-2020 MENR can involve to the project Water Resources State Agency, Amelioration JSC, MoH, Azersu JSC, Local authorities and basin organizations in basin districts and others	and others			
14. E**ducational measures**	E**ducational measures** Main activities are: ATo develop recommendations on possible educational measures aimed at creating water awareness in schools and the wider public and among users,, including: • Further strengthening of the measures on water awareness in Primary Education • Creation of a Web site promoting water consciousness • Educational programs for farmers • Regular meetings of basin organizations with mayors and	MENR, MoEd, MoH, MoA Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	Central Kura	2016-2021	50000

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
	community councils in small groups • Information and awareness guide in relation to pollution issues derived from activities in the primary sector 6. Educational programs for the public • Training and specialization of the personnel responsible for monitoring of ground water and data management • Campaign raising awareness on the management of rainwater				
15. **Works on monitoring , classification systems and Research**	**Monitoring , classification systems and Research** Main activities are: • Determining of reference conditions for classification of WBs. • Development of Monitoring program and an Assessment of Qualitative Data System (Annex V of the WFD) • Develop the ecological status assessment sytem of RWBs based on the monitoringof biological parameters(- macroinvertebrates and phytobenthos and etc) • To initiate the processes of development of valuation systems for the following biological quality and hydromorphological quality elements: - Hydromorphological parameters - Macrophytes - Benthic invertebrates in rivers	MENR, NAS, MoH, MoA, Water Resources State Agency, Azersu JSC, Local authorities and basin organizations in basin districts and others	Central Kura	2016-2021	45000

Measure	Actions	Lead organizations	Applied areas	Deadline	Cost
Supplementary measures					
	with non-continuous flow - Fishfauna • For a safe assessment of the status of all water bodies develop proposal on upgrading of existing monitoring network of WBs in pilot area • Setting of WFD compliant water quality standards and classification system				

Annex 5. List of the surface water bodies in Central Kura BD

DelName	DelCode	Criteria	Elevation, m	Geology	Length(km)	Area, km2	Type
RIVER WATER BODIES							
Aghstafachay	A 10-1-WB001R	R	200-800	Siliceous	14.0	1617	7
Aghstafachay	10-2-WB002R	R	200-800	Siliceous	11.8	2105	7
Aghstafachay	1011-1-WB003		200-800	Siliceous	23.7	187	4
Joghazchay	101-1-WB004		200-800	Siliceous	23.5	415	4
Aghstafachay	10-3-WB005R	R	200-800	Siliceous	4.6	2129	7
Aghstafachay	10-4-WB006R	R	200-800	Siliceous	14.8	2170	7
Aghstafachay	10-5-WB007R	R	200-800	Siliceous	16.4	2258	7
Akhinjachay	11-1-WB008		200-800	Siliceous	118.5	189	4
Akhinjachay	11-2-WB009	PR	200-800	Siliceous	8.2	226	4
Tovuzchay	111-1-WB0010	PR	200-800	Siliceous	11.6	496	4
Tovuzchay	11-2-WB011R	R	200-800	Siliceous	12.5	534	4
Asrikchay	112-1-WB012		>800	Siliceous	24.3	175	5
Asrikchay	112-2-WB013R	R	200-800	Siliceous	22.2	223	4
Tovuzchay	11-3-WB014R	R	200-800	Siliceous	11.1	782	4
Inekboganchay	201-1-WB015		>800	Siliceous	15.8	92.6	2
Qaramurad	2011-1-WB016		>800	Siliceous	18.6	123	5
Inekboganchay	201-2-WB017		>800	Siliceous	3.3	219	5

DelName	DelCode	Criteria	Elevation, m	Geology	Length(km)	Area, km2	Type
Bacanka	202-1-WB018		>800	Siliceous	8.1	70.5	2
Seyidovka	2021-1-WB019		>800	Siliceous	10.5	63.9	2
Bacanka	202-2-WB020		>800	Siliceous	9.9	238	5
Zayamchay	20-1-WB021		>800	Siliceous	24.6	662	5
Zayamchay	20-2-WB022	PR	200-800	Siliceous	11.7	750	4
Badachay	203-1-WB023		>800	Siliceous	25.1	99.1	2
Zayamchay	20-3-WB024R	R	200-800	Siliceous	29.2	939	4
Sarisuchay	211-1-WB025		>800	Siliceous	23.3	69.9	2
Agqayachay	212-1-WB026		>800	Siliceous	12.1	38.5	2
Shamkirchay	21-1-WB027		>800	Siliceous	8.9	179	5
Qoshqar	213-1-WB028		>800	Siliceous	7.9	85.2	2
Shamkirchay	21-2-WB029		>800	Siliceous	53.6	581	5
Gadabaychay	214-1-WB030		>800	Siliceous	12.4	70.4	2
Gadabaychay	214-2-WB031R	R	>800	Siliceous	6.0	109	5
Shamkirchay	21-3-WB032		>800	Siliceous	2.5	695	5
Emirvar	215-1-WB033		>800	Siliceous	6.4	99.6	2
Shamkirchay	21-4-WB034		>800	Siliceous	35.5	956	5
Shamkirchay	21-5-WB035R	R	200-800	Siliceous	31.2	1055.4	7
Shamkirchay	21-6-WB036R	R	<200	Siliceous	6.6	1073.5	6
Qoshqar	12-1-WB037	PR	>800	Siliceous	70.63	471.1	5

DelName	DelCode	Criteria	Elevation, m	Geology	Length(km)	Area, km2	Type
Qoshqar	12-3-WB038	R	200-800	Siliceous	37.6	866	4
Ganjachay	13-1-WB039		>800	Siliceous	34.4	303	5
Destefurchay	131-1-WB040		>800	Siliceous	27	75.0	2
Ganjachay	13-2-WB041	PR	>800	Siliceous	13.2	509	5
Ganjachay	13-3-WB42R	R	200-800	Siliceous	14.1	534	4
Ganjachay	13-4-HMWB43	HMWB-R	200-800	Siliceous	11.0	545	4
Ganjachay	13-4- WB44R	R	200-800	Siliceous	34.8	1389	4
Artificial WB							
DelName	**DelCode**	**Criteria**	**Elevation, m**	**Geology**	**Length(km)**	**Area, km2**	**Type**
Shamkir canal	10-1-AWB01	AWB	200-800	Siliceous	56.6	2040	1
Salahli canal	10-2-AWB02	AWB	200-800	Siliceous	11.2	2040	7
Kosalar canal	10-3-AWB03	AWB	200-800	Siliceous	10.5	2365	7
Dallar canal	21-1-AWB04	AWB	200-800	Siliceous	14.5	1037	7
Konullu canal	21-2-AWB05	AWB	200-800	Siliceous	14.8	1038	7
LAKE WATER BODIES							
DelName	**DelCode**	**Criteria**	**Elevation, m**	**Geology**	**Depth, m**	**Surface area, km2**	**Type**
Aghstafachay Rezervoir	10-1-HMWB01	HMWB -R	200-800	Siliceous	19.0	6.30	2
Tovuzchay Rezervoir	11-1-HMWB02	HMWB-PR	200-800	Siliceous	16.4	2.25	2
Zincirli Lake	13-1-LB04		>800	Siliceous	11.5	0.60	1

Annex 6. Program of Measures for Water bodies categorized as at risk due to both hydromorphological and pollution problems

N	Water Body	Description of risk factor	**EQO**	**PoM according to column 3 of Table 3**
1	10-1-WB001R	Water abstraction for irrigation and domestic purposes at Ijevan and Dilijan cities in Armenian territory has a significant impact on the Aghstafachay River section entering the Azeri territory flowing to Aghstafachay reservoir	Exemption Problem cannot be addressed because of unknown action by other countries (WFD Article 4(4))	Exemption Problem cannot be addressed because action by other countries is required (4(4))
2	10-2-WB002R	The Aghstafachay River section from Aghstafa reservoir to the confluence with the Joghazchay River is significantly affected by the water flow regulations (*Water regulation by sluices and dams is the main morphological alteration (CIS, Guidance Document #4). Downstream the dam of the Aghstafa Reservoir the water flow (and water level) regime is regulated by the system of sluices*) and water abstraction for irrigation. Water quality in reservoir also is not good	To have WFD compliant status assessment in place by 2021 Exemption: As WB is affected in upstream can o achieve less stringent environmental objectives (WFD Article 4(5)) Depending of status of WB set environmental objective accordingly	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also: -supplementary measures on study for construction of WSSS of Khanliqlar settlement (3349 persons(Measure 3, Annex 9) -water abstraction control from Agstafachay reservoir through Basic measure 12 (Annex 8)and Supplementary measure 4 and 8-12 (Annex 9)

3	10-3-WB005R	The Aghstafachay River section from the confluence with Joghazchay River to Gazakh city is a significantly affected by water abstraction for irrigation.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8 Implement of supplementary Measure 15 on WB classification (Annex 9) Implement measures on water abstraction control from Agstafachay reservoir and river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-12 (Annex 9)
4	10-4-WB006R	The Aghstafachay River section near Gazakh city is affected by water abstraction for irrigation and urban waste water discharge.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8 Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also: - Check how ongoing NWSS project on rehabilitation of WSSS of Gazakh city (20793) (Measure 2, Annex 9) will affect to reduction of pollution by household waste waters -water abstraction control from Agstafachay reservoir and Agstafachay river through Basic measure 12(Annex 8) and supplementary measures 4 and 8-12 (Annex 9)

5	10-5-WB007R	The Aghstafachay River section from the downstream of the Gazakh city to confluence with the Kura River is significantly affected by of the water flow regulations and water abstraction for irrigation. .	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also measures on: -water regulation impact on downstream flow regime through Basic measure 12 and 15(Annex 8) supplementary measures 4 and 10-11 (Annex 9)
6	(11-2-WB011R	The Tovuzchay River section from the Tovuzchay Reservoir to the confluence with the Asrikchay River is significantly affected by the water flow regulations and the water abstraction for irrigation	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also: -water abstraction control from Tovuzchay reservoir through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11 (Annex 9) Also - Check how ongoing NWSS project on rehabilitation of WSSS of Tovuz city (13520) (Measure 2, Annex 9) will affect to status of rivers

7	11-3-WB014R	The Tovuzchay River section after the confluence with the Asrikchay River to the river mouth is significantly affected by water abstraction for irrigation.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9 Implement also measures on water abstraction control from Tovuzchay reservoir and river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11 (Annex 9)
8	112-2-WB013R	The Asrikchay River from the Asrik village to the confluence with the Tovuzchay River is significantly affected by water abstraction for irrigation and the waste water discharge.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also measures : - Study how can be organized WSSS rehabilitation project on rehabilitation of WSSS of Jirdahan village (4790) (Measure 3 ,Annex 9) - study how planning to be constructed Zayamchay water reservoir will affect flow regime of river through supplementary measures 12 (Annex 9)

9	20-3-WB024R	The Zayamchay River section from the Tatarli settlement to the confluence with the Shamkir Reservoir is significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also: - Study how can be organized WSSS rehabilitation project on rehabilitation of WSSS of Tatarli illage (4790) and Zayam village(7645) (Measure 2, Annex 9)) - study how planning to be constructed Zayamchay water reservoir will affect flow regime of river through supplementary measures 12(Annex 9)
10	214-2-WB031R	The Gadabaychay River section from the Gedebay city to the confluence with the Shamkirchay River is significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also: - Study how can NWSS project on rehabilitation of WSSS of Gadabey city (10146) (Measure 2, Annex 9) will affect to reduction of pollution by household waste waters - Implement also supplementary measures on water abstraction control from Gadabay river

				through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11(Annex 9)
11	21-5-WB035R	The Shamkirchay River section from the Mehrili settlement to the Yeniabad Vilage is significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also: - Study how can be organized project on rehabilitation of WSSS of Mehirli village (Measure 3, Annex 9) - Implement also supplementary measures on water abstraction control from Shamkirchay water reservoir and Shamkirchay river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11(Annex 9)
12	21-6-WB036R	The Shamkirchay River section from the Yeniabad Village to the confluence with the Shamkir Reservoir is significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9)) Implement also: -supplementary measures

				- Study how can be organized project on rehabilitation of WSSS of Yeniabad village(6822) (Measure 3, Annex 9) - Implement also measures on water abstraction control from Shamkirchay water reservoir and Shamkirchay river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11(Annex 9)
13	12-2-WB038R	The Qoshqarchay River from the Hachaqaya settlemennto to the confluence with the Kura River is significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also: - Study how can be organized project on rehabilitation of WSSS of Hachaqaya village (Measure 3, Annex 9) - Implement also supplementary measures on water abstraction control from Qoshqarchay river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11(Annex 9)
14	13-3-WB42R	The Ganjachay River from the Goygol city till upstream of Ganja city) is significantly affected by the anthropogenic activities of water	To have WFD compliant status assessment in place by 2021	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified

		abstraction for irrigation and the waste water discharge.	Depending of WB status (Table 33, column1) set objectives (column 2)	in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also measures - Study how can NWSS project on rehabilitation of WSSS of Goygol city (Measure 2, Annex 9) will affect to reduction of pollution by household waste waters - Implement also supplementary measures on water abstraction control from Ganjachay river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11(Annex 9) Conduct study how construction of Ganjachay reservoir will help to provide irrigation WS and implement Environmental Flow requirements
15	13-5-WB43 R,	The Ganjachay River from upstream of Ganja city till Kura river is significantly affected by the anthropogenic activities of water abstraction for irrigation and the waste water discharge.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also measures - Study how can NWSS project on rehabilitation of WSSS of Ganja city (313249) (Measure 2, Annex 9) will affect to reduction of pollution by household waste

				waters - Implement also supplementary measures on water abstraction control from Ganjachay river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-119Annex 9) Conduct study how construction of Ganjachay reservoir will help to provide irrigation WS and implement Environmental Flow requirements

ANNEX 7. Program of Measures for Water bodies categorized as possibly at risk due to both hydromorphological and pollution problems

N	Water Bodu	Description of risk factor	**EQO**	**PoM according to column 3 of Table 3**
1	111-1-WB0010	The Tovuzchay river section from from place of entering to Azeri territory till Tovuzchay reservoir is affected by the water abstraction for the irrigation purposes and also waste water from the settlemnts and nutrients from the agricultural activities may have impact on the water quality.	Exemption Problem cannot be addressed because of unknown action by other countries (WFD Article 4(4))	Exemption Problem cannot be addressed because of lack of action by other countries (WFD Article 4(4))
2	11-2-WB009	The Akhinjachay river section from from place of entering to Azeri territory till Tovuzchay reservoir is affected by the water abstraction for the irrigation purposes and also waste water from the settlemnts and nutrients from the agricultural activities may have impact on the water quality.	Exemption Problem cannot be addressed because of unknown action by other countries (WFD Article 4(4))	Exemption Problem cannot be addressed because of lack of action by other countries (4(4))
3	20-2-WB022	The Zayamchay river section from Yaniqli to Kohnagala settlement. Both water abstraction for the irrigation purposes and waste water from the several settlements can have an impact on the river water.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also - Study how can be organized NWSS project on rehabilitation of WSSS of Yaniqli illage (4894) and Kohnaqala

				village(7020) (Measure 3, Annex 9) - Implement also supplementary measures on water abstraction control from Zayamchay river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11 (Annex 9) - study how planning to be constructed Zayamchay water reservoir will affect flow regime of river through supplementary measures 12(Annex 9)
4	12-1-WB037	The Qoshkachay river section from the Bayan to Metalurgic factory. In this part of the river water is abstracted for industrial purposes and also waste water from the factory is discharge directly to the river.	To have WFD compliant status assessment in place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	Depending of WB status implement measures identified under numbers 2, 3 or 4 of Table 33 (last column, including basic measures identified inAnnex 8) Implement of supplementary Measure 15 on WB classification (Annex 9)) Implement also - Study how can treatment of industrial waste waters be provided before discharging into river (Measure 4,6) - Implement also Basic measure 1-15(Annex 8)
5	13-2-WB041	The Ganjachay river section from Topalhasanli settlement to Goygol city. Water abstraction and waste	To have WFD compliant status assessment in	Depending of WB status implement measures identified under numbers 2,

		water from the settlements may have an impact on the river water.	place by 2021 Depending of WB status (Table 33, column1) set objectives (column 2)	3 or 4 of Table 33 (last column, including basic measures identified in Annex 8) Implement of supplementary Measure 15 on WB classification (Annex 9) Implement also - Study how can project on rehabilitation of WSSS of Topalhasanli village (Measure 3, Annex 9) can be organized - Implement also supplementary measures on water abstraction control from Ganjachay river through Basic measure 12(Annex 8) and Supplementary measure 4 and 8-11 (Annex 9) Conduct study how construction of Ganjachay reservoir will help to provide irrigation WS and implement Environmental Flow requirements

Annex 8: Summary of the risk assessment results due to the hydromorphological pressures for the Central Kura RBD

	DelName	DelCode	Description	Data availability	Type of pressure	Impact	Risk category	Comment
1	Aghstafachay	A 10-1-WB001R	Aghstafachay River section from place of entering to Azeri territory till Aghstafachay reservoir	Yes National monitoring programme	Water abstraction	Hydrological regime changed	R	Based on the data from the national monitoring programme (statistical analysis) around 40 % less water volume entered to Azerbaijan from Armenia.
2	Aghstafachay	10-2-WB002R	Aghstafachay River section from Aghstafa reservoir till confluence of Joghazchay	Yes	Water abstraction	Hydrological regime changed	R	Only data on the whole region are available, regarding the water abstraction.
3	Joghazchay	1011-1-WB003	Joghazchay River section from place of entering to Azeri territory till Joghazchay reservoir	Not	Water abstraction	Hydrological regime is partly changed	PR	It would be necessary to make additionalmeasuremnt regarding the hydrological conditions.
4	Joghazchay	101-1-WB004	Joghazchay River section from Joghazchay reservoir till confluence Aghstafachay	Yes, JFS	Water abstraction	Hydrological regime is partly changed	PR	It would be necessary to make additionalmeasuremnt regarding the hydrological conditions and also data from the reservoir management will be necessary to receive.
5	Aghstafachay	10-3-WB005R	Aghstafachay River section from the	Not	Water abstraction	Hydrological regime changed	R	Water is abstracted for the irrigation purposes.

			confluence of Joghazchay till Gazakh city		and river morphology			
6	Aghstafachay	10-4-WB006R	Aghstafachay River section from upstream of Gazakh city till downstream of Gazakh city	Yes, JFS	Water abstraction, river continuity and river morphology	Hydrological regime changed	R	Water is abstracted for the irrigation purposes and almost all water used (very low river flow discharges were observed during the JFS (2014).
7	Aghstafachay	10-5-WB007R	Aghstafachay River section from downstream of Gazakh city till confluence of Kura river	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Almost all volume of river water is used during the vegetation season (based on the JFS 2014).
8	Axinjachay	11-1-WB008	Akhinjachay river section from source till entering Armenian territory	Yes, JFS			NR	
9	Axinjachay	11-2-WB009	Akhinjachay River section from place of entering to Azeri territory till Tovuzchay reservoir	Yes, JFS	Water abstraction		PR	It would be necessary to make additionalmeasuremnt regarding the hydrological conditions (transboundayr river).
10	Tovuzchay	111-1-WB0010	Tovuzchay River section from place of	Yes, JFS	Water abstraction		PR	It would be necessary to make additionalmeasuremnt regarding the

			entering to Azeri territory till Tovuzchay reservoir					hydrological conditions (transboundayr river).
11	Tovuzchay	11-2-WB011R	Tovuzchay river section from Tovuzchay reservoir till confluence Asrikchay river	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Almost all volume of river water is used during the vegetation season (based on the JFS 2014 field observation).
12	*Asrikchay*	112-1-WB012	Asrikchay river section from source till Asrik village	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
13	*Asrikchay*	112-2-WB013R	Asrikchay River from Asrik village till the confluence Tovuzchay river				R	Water abstraction
14	Tovuzchay	11-3-WB014R	Tovuzchay River section after confluence Asrikchay till confluence Kura river	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Almost all volume of river water is used during the vegetation season (based on the JFS 2014 field observation).
15	Inekboganchay	201-1-WB015	Inekboganchay river from source till confluence Qaramurad river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
16	Qaramurad	2011-1-	Qaramurad river	Not			NR	Based on the available information

		WB016	from source till confluence Inekboganchy river					and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
17	Inekboganchay	201-2-WB017	Inekboganchay river from after confluence Qaramurad river till confluence Zayamchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
18	Bacanka	202-1-WB018	Bacanka river from source till confluence Seyidovka river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
19	Seyidovka	2021-1-WB019	Seyidovka river from source till confluence Bacanka river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
20	Bacanka	202-2-WB020	Bacanka river from after confluence Seyidovka river till Zayamchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
21	Zayamchay	20-1-WB021	Zayamchay river from confluence Bacanka river till Ahmadabad village	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
22	Zayamchay	20-2-WB022	Zayamchay river from Ahmadabad village till confluence Badachay	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the

			river					hydromorphology alterations.
23	Badachay	203-1-WB023	Badachay river from Source till confluence Zayamchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
24	Zayamchay	20-3-WB024R	Zayamchay river from after confluence Badachay river till Shamkir reservoir	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Almost all volume of river water is used during the vegetation season (based on the JFS 2014 field observation).
25	Sarisuchay	211-1-WB025	Sarisuchay river from Source till confluence Agqayachay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
26	Agqayachay	212-1-WB026	Agqayachay river from Source till confluence Shamkirchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
27	Shamkirchay	21-1-WB027	Shamkirchay river from after confluence Agqayachay river till Qoshqar river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
28	Qoshqarchay	213-1-WB028	Qoshqar river from source to confluence Shamkirchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
29	Shamkirchay	21-2-	Shamkirchay river	Not			NR	Based on the available information

		WB029	from mouth of Qoshqar river till confluence to Gadabaychay river					and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
30	Gadabaychay	214-1-WB030	Gadabaychay river from Source till upstream Gadabay city	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
31	Gadabaychay	214-2-WB031R	Gadabaychey river from upstream of Gadabay city till confluence Shamkirchay river	Yes, JFS			NR	Hydromorphological conditions were not changed (JFS field observation).
32	Shamkirchay	21-3-WB032	Shamkirchay river from mouth of Gadabay river till confluence Emirvar river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
33	Emirvar	215-1-WB033	Emirvar river from Source till to confluence Shemkirchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.
34	Shamkirchay	21-4-WB034	Shamkirchay river from mouth of Emirvar river till upstream of Mehrli village	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the hydromorphology alterations.

35	Shamkirchay	21-5-WB035R	Shemkirchey river from Mehrli village till Yeniabad village	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Based on the JFS 2014 field observation water is abstracted mainly for the irrigation purpose.
36	Shamkirchay	21-6-WB036R	Shemkirchey river from Yeniabad village till mouth	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Almost all volume of river water is used during the vegetation season (based on the JFS 2014 field observation).
37	Qoshqarchay	12-1-WB037	Qoshqarchay river from source till Qoshqarchay reservoir	Yes, JFS	Water abstraction by the camping	Hydrological regime may be changed	PR	There was recognized increased number of camps in the upstream part of the river basin (see Figure 2).
38	Qoshqarchay	12-2-WB038R	Qoshqarchay river from Qoshqarchay reservoir till confluence of Xeyrechay river				R	Water abstraction Hydromorphological alteration
39	Xeyrechay	121-1-WB039	Xeyrechay river from Source till confluence Qoshqarchay river				NR	
40	Qoshqarchay	12-3-WB040	Qoshqarchay river from mouth of Xeyrechay river till Upstream of Seyidler village	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Based on the JFS 2014 field observation water is abstracted mainly for the irrigation purpose.
41	Qoshqarchay	12-4-	Qoshqarchay river	Yes, JFS	Water	Hydrological	R	Based on the JFS 2014 field

		WB041	from Seyidler village till confluence Kura river		abstraction and river morphology	regime changed		observation water is abstracted mainly for the irrigation purpose.
42	Ganjachay	13-1-WB042	Ganjachay river from Source till confluence Destefurchay river	Yes, JFS			NR	
43	Destefurchay (Mirzikchay)	131-1-WB043	Destefurchay river from source till confluence Ganjachay river	Yes, JFS			NR	
44	Ganjachay	13-2-WB044	Ganjachay river from mouth of Destefurchay river till Topalhasanli village	Yes, JFS	Water abstraction by households	Hydrological regime may be changed during the season	PR	There are water abstraction points (based on the JFs field observation).
45	Ganjachay	13-3-WB45R	Ganjachay river from Topalhasanli village till upstream of Ganja city	Yes, JFS	Water abstraction	Hydrological regime changed	R	Based on the JFS 2014 field observation water is abstracted mainly for the irrigation purpose.
46	Ganjachay	13-4-HMWB46	Ganjachay river from upstream of Ganja city till downstream of Ganja city	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Based on the JFS 2014 field observation water is abstracted mainly for the irrigation purpose. Only small volume of water from the sewer system (see Fig. 3)

47	Ganjachay	13-5-WB47R	Ganjachay river from downstream of Ganja city till upstream of Lek village	Yes, JFS	Water abstraction and river morphology	Hydrological ****regime changed	R	Based on the JFS 2014 field observation water is abstracted mainly for the irrigation purpose.
48	Ganjachay	13-6-WB48R	Ganjachay river from upstream of Lek village till confluence Kura river	Yes, JFS	Water abstraction and river morphology	Hydrological regime changed	R	Based on the JFS 2014 field observation water is abstracted mainly for the irrigation purpose.

Annex 9. Hydromorphological Data – July 2014 JFS THE CENTRAL KURA BD (AZ)

Sampling site number	River	Location of sampling site	Sampling date	Latitude	Longitude	Altitude m.a.s.l	Q (m3/s)	v (m/s)	width (m)	depth (m)	HMQE Score
1	Tovuzchay	Oysuzlu	21.7.2014	40°56’38,6	45°34’11,4	502	0,1	0,41	2,60	0,09	3,2
2	Akhinjachay	Upper Tovuz	21.7.2014	40°56’51,9	45°34’45,2	468	0,18	0,51	2,20	0,16	2,2
3	Agstafachay	Below reservoir	21.7.2014	41°03’07,1	45°16’18,2	440	2,2	0,34	32	0,2	4,3
4	Jagazchay	Alpod	21.7.2014	41°04’45,4	45°12’13,1	529	1,2	0,47	10	0,26	2,15
5	Agstafachay	Mollarjafirli	21.7.2014	41°09’31,8	45° 25’26,5	286	0,15	0,48	1,9	0,17	3,3
6	Tovuzchay	Alimardanli	22.7.2014	41°02’20,7	45°42’24,7	254	0,29	0,52	3,40	0,17	3,2
7	Akhinjachay	Qaralar	22.7.2014	40°43’14,4	45°29’21,0	1202	0,87	0,78	6,6	0,17	1,1
8	Zayamchay	Agbashlar	22.7.2014	40°39’48,7	45°39’24,8	1025	2,8	1,0	8,0	0,35	1,05
9	Zayamchay	Yaniqli	22.7.2014	40°45’25,7	45°40’20,7	790	3,2	1,0	9,3	0,35	1,2
10	Zayamchay	Khonogalo	23.7.2014	40°52’36,5	45°45’44,2	500	0,19	0,39	4,1	0,12	3,3
11	Qoshkachay	Khoshbulaq	23.7.2014	40°26’14,1	46°01’50,8	1707	0,046	0,46	1,0	0,10	1,15
12	Zaylilchay	Gushchu	23.7.2014	40°33’29,1	46°04’30,6	1179	0,042	0,47	1,35	0,07	1,1
13	Qoshkachay	Bayan	23.7.2014	40°32’32,1	46°06’38,6	1046	0,60	0,56	5,8	0,14	1,15
14	Qoshkachay	Met-factory	24.7.2014	40°38’15,1	46°14’13,0	596	0,3	0,5	3,2	0,18	
15	Shamkirchay	Below highway bridge	24.7.2014	40°48’35,6	46°06’33,5	347	0,13	0,51	1,90	0,13	4,3
16	Gadabaychay	Gadabay	24.7.2014	40°34’03,3	45°49’30,2	1361	0,12	0,71	1,4	0,12	1,15
17	Mirzikchay	Shehriyar	25.7.2014	40°31’11,4	46°11’59,5	1064	0,01	0,3	0,45	0,075	1,13

18	Ganjachay	Zurnabad	25.7.2014	40°29’53,7	46°14’30,4	888	3,70	1,11	12,35	0,27	1,03
19	Ganjachay	Topalhasanli	25.7.2014	40°34’05,8	46°17’52,2	682	1,25	0,77	8,8	0,20	2,3
20	Ganjachay	Ganja	25.7.2014	40°40’32,5	46°21’57,2	420	0,009	0,25	0,9	0,04	4,6

Annex 10 . Summary on the risk assessment from both point and diffuse sources of pollution on the surface water bodies in the Central Kura BD

	DelName	DelCode	Description	Data availability	Type of pressure	Impact	Risk category	Comment
1	Aghstafachay	A 10-1-WB001R	Aghstafachay River section from place of entering to Azeri territory till Aghstafachay reservoir	Yes National monitoring programme			NR	
2	Aghstafachay	10-2-WB002R	Aghstafachay River section from Aghstafa reservoir till confluence of Joghazchay	Yes	Water quality	Water quality changed due to content of sediments from the reservoir	PR	It would be necessary to make additional observations to have more insight on the overall water quality
3	Joghazchay	1011-1-WB003	Joghazchay River section from place of entering to Azeri territory till Joghazchay reservoir	Yes			NR	
4	Joghazchay	101-1-WB004	Joghazchay River section from	Yes, JFS			NR	

			Joghazchay reservoir till confluence Aghstafachay					
5	Aghstafachay	10-3-WB005R	Aghstafachay River section from the confluence of Joghazchay till Gazakh city	Not	Water quality	Water quality changed due to content of sediments from the reservoir	PR	It would be necessary to make additional observations to have more insight on the overall water quality.
6	Aghstafachay	10-4-WB006R	Aghstafachay River section from upstream of Gazakh city till downstream of Gazakh city	Yes, JFS	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged.
7	Aghstafachay	10-5-WB007R	Aghstafachay River section from downstream of Gazakh city till confluence of Kura river	Yes, JFS	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged.
8	Axinjachay	11-1-WB008	Akhinjachay river section from source till entering Armenian	Yes, JFS			NR	

			territory					
9	Axinjachay	11-2-WB009	Akhinjachay River section from place of entering to Azeri territory till Tovuzchay reservoir	Yes, JFS	Agricultural activities (both crop production and livestock production)		PR	It would be necessary to make additionalmeasuremnt regarding the water quality (transboundayr river).
10	Tovuzchay	111-1-WB0010	Tovuzchay River section from place of entering to Azeri territory till Tovuzchay reservoir	Yes, JFS	Agricultural activities (both crop production and livestock production)		PR	It would be necessary to make additionalmeasuremnt regarding the water quality (transboundayr river).
11	Tovuzchay	11-2-WB011R	Tovuzchay river section from Tovuzchay reservoir till confluence Asrikchay river	Yes, JFS	Agricultural activities (both crop production and livestock production)		PR	It would be necessary to make additionalmeasuremnt regarding the water quality.
12	*Asrikchay*	112-1-WB012	Asrikchay river section from source till Asrik village	Not			NR	Based on the calculation and expert judgement, there was no risk found.
13	*Asrikchay*	112-2-WB013R	Asrikchay River from Asrik				R	Water abstraction

			village till the confluence Tovuzchay river					
14	Tovuzchay	11-3-WB014R	Tovuzchay River section after confluence Asrikchay till confluence Kura river	Yes, JFS	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged.
15	Inekboganchay	201-1-WB015	Inekboganchay river from source till confluence Qaramurad river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
16	Qaramurad	2011-1-WB016	Qaramurad river from source till confluence Inekboganchy river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
17	Inekboganchay	201-2-WB017	Inekboganchay river from after confluence Qaramurad river	Not			NR	Based on the available information and expert judgement, there should not be

			till confluence Zayamchay river					any pressure regarding the point and diffuse sources of pollution.
18	Bacanka	202-1-WB018	Bacanka river from source till confluence Seyidovka river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
19	Seyidovka	2021-1-WB019	Seyidovka river from source till confluence Bacanka river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
20	Bacanka	202-2-WB020	Bacanka river from after confluence Seyidovka river till Zayamchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.

21	Zayamchay	20-1-WB021	Zayamchay river from confluence Bacanka river till Ahmadabad village	Yes, JFS	Agricultural activities (both crop production and livestock production)		PR	It would be necessary to make additionalmeasuremnt regarding the water quality.
22	Zayamchay	20-2-WB022	Zayamchay river from Ahmadabad village till confluence Badachay river	Yes, JFS	Agricultural activities (both crop production and livestock production)		PR	It would be necessary to make additionalmeasuremnt regarding the water quality.
23	Badachay	203-1-WB023	Badachay river from Source till confluence Zayamchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
24	Zayamchay	20-3-WB024R	Zayamchay river from after confluence Badachay river till Shamkir reservoir	Yes, JFS	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged.
25	Sarisuchay	211-1-WB025	Sarisuchay river from Source till	Not			NR	Based on the available information

			confluence Agqayachay river					and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
26	Agqayachay	212-1-WB026	Agqayachay river from Source till confluence Shamkirchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
27	Shamkirchay	21-1-WB027	Shamkirchay river from after confluence Agqayachay river till Qoshqar river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
28	Qoshqarchay	213-1-WB028	Qoshqar river from source to confluence Shamkirchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of

								pollution.
29	Shamkirchay	21-2-WB029	Shamkirchay river from mouth of Qoshqar river till confluence to Gadabaychay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
30	Gadabaychay	214-1-WB030	Gadabaychay river from Source till upstream Gadabay city	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
31	Gadabaychay	214-2-WB031R	Gadabaychey river from upstream of Gadabay city till confluence Shamkirchay river	Yes, JFS	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged and no macroinvertebrates were found during the JFS 2.
32	Shamkirchay	21-3-WB032	Shamkirchay river from mouth of Gadabay river till confluence	Not	Untreated waste water, agricultural activities (both crop		PR	It would be necessary to make additionalmeasuremnt regarding the water

			Emirvar river		production and livestock production)			quality.
33	Emirvar	215-1-WB033	Emirvar river from Source till to confluence Shemkirchay river	Not			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
34	Shamkirchay	21-4-WB034	Shamkirchay river from mouth of Emirvar river till upstream of Mehrli village	Not	Untreated waste water, agricultural activities (both crop production and livestock production)		PR	It would be necessary to make additionalmeasuremnt regarding the water quality.
35	Shamkirchay	21-5-WB035R	Shemkirchey river from Mehrli village till Yeniabad village	Not	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged and no macroinvertebrates were found during the JFS 2.
36	Shamkirchay	21-6-WB036R	Shemkirchey river from Yeniabad village till	Yes	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged and no macroinvertebrates

			mouth					were found during the JFS 2.
37	Qoshqarchay	12-1-WB037	Qoshqarchay river from source till Qoshqarchay reservoir	Yes, JFS			NR	Based on the available information and expert judgement, there should not be any pressure regarding the point and diffuse sources of pollution.
38	Qoshqarchay	12-2-WB038R	Qoshqarchay river from Qoshqarchay reservoir till confluence of Xeyrechay river	Yes, JFS	Untreated waste water	High content of suspended solids	R	Untreated waste waters are discharged and only very tolerant macroinvertebrates taxa were found during the JFS 2.
39	Xeyrechay	121-1-WB039	Xeyrechay river from Source till confluence Qoshqarchay river				NR	
40	Qoshqarchay	12-3-WB040	Qoshqarchay river from mouth of Xeyrechay river till Upstream of Seyidler village	Not	Untreated waste water		R	It is expected that untreated waste waters from the upstream part of the catchment ares will have significant impact on the water quality. Therefore it

								was decided to categorize this water body as at risk.
41	Qoshqarchay	12-4-WB041	Qoshqarchay river from Seyidler village till confluence Kura river	Yes, JFS	Untreated waste water	High content of suspended solids	R	Untreated waste waters are discharged and only very tolerant macroinvertebrates taxa were found during the JFS 2.
42	Ganjachay	13-1-WB042	Ganjachay river from Source till confluence Destefurchay river	Yes, JFS			NR	
43	Destefurchay (Mirzikchay)	131-1-WB043	Destefurchay river from source till confluence Ganjachay river	Yes, JFS			NR	
44	Ganjachay	13-2-WB044	Ganjachay river from mouth of Destefurchay river till Topalhasanli village	Yes, JFS	Untreated waste water, agricultural activities (both crop production and livestock production)	Increased amount of algae on the stones od the river bed.	PR	It would be necessary to make additionalmeasuremnt regarding the water quality.

45	Ganjachay	13-3-WB45R	Ganjachay river from Topalhasanli village till upstream of Ganja city	Yes	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged and no macroinvertebrates were found during the JFS 2.
46	Ganjachay	13-4-HMWB46	Ganjachay river from upstream of Ganja city till downstream of Ganja city	Yes	Untreated waste water	High content of organic matter and nutrients	R	Untreated waste waters are discharged and no macroinvertebrates were found during the JFS 2.
47	Ganjachay	13-5-WB47R	Ganjachay river from downstream of Ganja city till upstream of Lek village	Not	Untreated waste water		R	It is expected that untreated waste waters from the upstream part of the catchment ares will have significant impact on the water quality. Therefore it was decided to categorize this water body as at risk.

ANNEX 11. Protected area in the Central Kura BD

Goygyol national park

Goygol National Park was established on April 1, 2008 with the Order of the President of the Republic of Azerbaijan on the base of Goygol State Nature Reserve in the administrative territory of Khanlar (present Goygyol), Dashkasan and Goranboy districts. After having the status of National Park, the territory of Goygol State Nature Reserve enlarged from 6739 hectares up to 12 755 hectares. Goygyol National Park is located in the North – Eastern part of Lesser Caucasus, on the Northern Slope of Kapaz Mountain, on 1000 – 3060 m a.s.l. and encloses medium and high mountain – forest semi zones, mountain forest – meadow, subalpine and alpine zones. National Park is called after the name of Goygol Lake (Figure 2.3). The reason for that is its transparent water which reflects surrounding green forests and blue sky as a mirror.

Figure 26. View of Goy-Go Lake(Source. www.eco.gov.az)

The principal aim of establishment of Goygyol National Park is protection of endemic and endangered flora and fauna species, regulation of the stability of natural complexes, creation of more favorable condition in order to conduct scientific – research activities, environmental monitoring, raising awareness of population and development of ecotourism in potential touristic areas.

The longest river in Goygol National Park is Aghsuchay River– the right branch of Kurakchay River. The biggest lake in the area is Goygol Lake– one of the most wonderful and marvelous lakes in Azerbaijan. In 1139 as a result of earthquake occurred in Ganca, Kapaz mountain was tumbled down, the Aghsuchay River was blocked up and the beautiful - Goygol Lake was formed. There are small lakes, such as Maralgol, Garagol, Zeligol, Aggol, Shamligol etc. in the area. The main part of the national park has a rich vegetation cover. The mountain – forest, mountain – steppe, subalpine and alpine mountain – meadow vegetation ecosystem is developed in the area.

The mountain forests covering 1100 – 2200 m height has very rich vegetation cover and contains 80 trees and bush species. The main part of the forests are represented by oriental beech, oriental oak, Caucasian hornbeam, birch, ash tree, sharp-leaved maple, lime-tree of small-leaved trees, Kokh pine of coniferous. Of shrubs, cornel, barberry, dog rose, medlar, spindle-tree, blackberry, of herbs, Caucasian violet, dandelion, bellflower, noble chamomille, fescue, mat-grass and meadow-grass and etc. are usual too.

They are especially spread in subalpine meadows.

Goygyol National Park is also rich for its fauna. Mammals such as, Caucasian red deer, roe deer, brown bear, billy goat, badger, forest cat, sable, lynx, hare, squirell, fox, hedgehog, Caucasian mole and etc., of birds quail, stock dove, wood cock, bearded vulture, black vulture, Egyptian vulture, eagle owl, owl, swan, black woodpeeker, golden oriole, wood lark, mistle thrush etc. are spread in the area. Rare species such as, Caucasian red deer and forel fish (in Goy gol lake) are protected in the national park. Beautiful and variegated nature, rich flora and fauna of Goygyol National Park will enable to organize and develop ecotourism in the area by attracting tourists and visitors.

Garayazi state nature reserve

Year of foundation: 1978
Area (hectare): 9,658
Location: Within the territory of administrative district, on the bank of the River Kura in the Agstafa forestry.

Description: The Gara-Yaz State Reserve for the protection and restoration of the Kura tugay forests. The Gara-Yaz reserve is in the western part of Azerbaijan. Its territory covers the flood lands of the River Kura and the Gara-Yaz Lowland on the left bank of the River Kura. In the region where the reserve is situated, the tugay forest and steppe lowland landscapes are typical. In the past, a continuous line of tugay forest extended along the middle and lower reaches of the River Kura, which was surrounded by forest to an extent of 600 km. The territory of the reserve is part of the quaternary accumulative lowland, sloping slightly to the River Kura. Here the climate is that of moderate warm semi-desert and arid steppe, for which a warm and dry summer and moderate winter are typical. The main protected objects are the biggest tract of tugay forests of the middle reaches of the River Kura and the rare and endangered ecosystems of tugay. Along the river, shrubbery of willow, hawthorn, barberry, elaeagnus and others grow(*www.eco.gov.az*).

Eldar shamy state nature reserve
Year of foundation: 2004

Area (hectare): 1686

Location: Within the territory of Samukh administrative district.

Description: The Eldar pine-tree State Reserve was established to preserve the genetic heritage, biological diversity of ecological systems, unique forests of Eldar pine trees. The pine trees growing here are of 100 -120 years old and 2-6 m high. Fauna in this reserve area is not very variable – among animals only hares inhabit here and among birds – partridges. Eldar pine tree is included in the Red Book of Azerbaijan Republic.

List of State Nature Sanctuaries in the region is given in Table 27 (www.eco.gov.az)

Table 27. State Nature Sanctuaries

№	Name of the SPNA	Administrative territory	Area (ha)	Date of establishment
1	Korchay SNS	Goygol and Goranboy regions	15 000	1961
2	Shamkir SNS	Shamkir region	10 000	1964
3	Garayazy-Aghstafa SNS	Aghstafa region	10 000	1964
4	Qızılja SNS	Gadabay region	5135	1984

Annex 12. State of Water supply and Waste Water Treatment System in Cenral Kura BD

Under new National WSSS rehabilitation project waters of Shamkirchay reservoir through the underground concrete pipes will be delivered to Shamkir and Ganja cities by the end of this year or in 2015. This will also improve drinking water supply in Ganj

By information of Tovuz office of Amelioration JSC in May 2014 Water supply of Tovuz city also according to the National WSSS rehabilitation program is under completion and will be fully operational by end of the year of by 2015 by use of Zayamchay river bed waters. New WWTP (near Girzan village) is supposed to treat waste waters and discharge them into nearby located lowland area.

. *WSSS current status and plans for near future*

Cities	**Existing Water Sources**	**Existing Water Networks**	**Water supply systems under construction**	**Existing sewerage system**	**Existing waste water disposal site**	**Sewerage system under reconstruction**
Qazax	1. Cogazchay (drainage) 15-20 l/s 2. Didaban w/r - 10-12 l/s 3.Shır-shır well 4. 5 sub-artesian wells - 5-10 l/s	L=23,3 km. System became completely outdated and serves only 53% of population	There are sub-artesian well along Aghstafachay river with total water consumption - 162l/s. It will serve 100% of urban population. Investment cost are 20-25 million USD	Founded in 1970. Overall length is 31 km. It became completely outdated and serves only 28% of population.	Although there is Waste Waters Treatments Facility on the left bank of Aghstafachay river but doesn't work	The sewerage systems and Waste Waters Treatments Facility (200l/s) which is on the left bank of Aghstafachay river will be reconstructed. It will serve 100% of urban population. Investment cost are 30-35 million USD.
Gadabay	1. Sudlubulaq well 125-30 l/s 2. Qarachokak river - 5-7 l/s	L=9 km. System became completely outdated and serves only 30-40% of	Südlübulaq well 1 and Südlübulaq well 2-TOTAL-80-85 l/s It will serve 100% of urban	Does not exist	Does not exist	The sewerage systems and Waste Waters Treatments Facility (40l/s) which is on the bank of Mis river will be

		population.	population. Investment cost are 14-18 million USD			reconstructed. And treated water will be discharged into Mis river. It will serve 100% of urban population. Investment cost are 15-20 million USD
Dashkasan	1. Qoshqarchay river - 20-30 l/s 2. Gurbulaq well-15 l/s	L=6,5 km. System became completely outdated.	1. number of Qarainək wells system is 4 - 40 l/s 2. Gurbulaq -15 l/s It will serve 100% of urban population. Investment cost are 8-10 million USD.	Overall length is 6 km. became completely outdated and serves only 90% of population.	There is no Waste Waters Treatments Facility. Therefore waste waters are discharged into Goshgarchay river	The sewerage systems and Waste Waters Treatments Facility (40l/s) which is on the bank of Qoşqarçayı river will be reconstructed. And treated water will be discharged into Qoşqarçayı river. It will serve 100% of urban population. Investment cost are 12-15 million USD.
Cities	**Existing Water Sources**	**Existing Water Networks**	**Water supply systems under construction**	**Existing sewerage system**	**Existing waste water disposal site**	**Sewerage system under reconstruction**
Ganja	1. Göygol lake – 100-120 l/s 2. Qızılqaya -280 l/s 3. 183 sub-artesian wells located within	L=326 km. System has been used for 40 years	1. Göygol lake – 250 l/s 2. Şəmkir w/r-1080 l/s 3. Qızılqaya -	Founded in 1970. Overall length is L= 250 km.	Founded in 1980. Currently Waste Waters Treatment	Sewerage system if the city and Waste Waters Treatment Facility (7000

	the city	and became completely outdated and serves only 65% of population.	280 l/s It will serve 100% of city population. Investments costs are 200-250 million USD.	And serves 55% of population. Currently sewerage system for some parts of the city is doesn't exist.	Facility doesn't work. Waste waters are directly discharged into Ganjachay river.	l/sec) located in Samukh rayon will be reconstructed. Treated water will be discharged into the drainage collector and will serve 100% of city population. Investment costs are 350-400 million USD.
Agstafa	There are 6 sub-artesian wells in the left bank of Hasanchay river of Eynalli village and 2 sub-artesian wells in the right bank.	L=55 km Founded in 1965-70 years and System became completely outdated and serves only 60% of population.	*5 new wells in the left bank of Hasanchay river 120 l/san. It will serve 100% of city population. Investment costs are 15-20 million USD.*	Founded in 1980-86. Overall length is L= 10 km. Currently is doesn't work. It serves 20% of population.	Untreated water is dischared into Aghstafachay river. There is no Waste Waters Treatment Facility	Waste Waters Treatment Facility located in the distance of around 740 m from the city Treated water will be dischared into Aghstafachay river. It will serve 100% of city population. Investment costs are 30-35 million USD.

Annex 13. Ongoing reservoir construction projects in Central Kura BD

Below are shown water reservoirs which are under construction and planned to be constructed

TECHNICAL AND ECONOMIC PARAMETERS

Dam /Location:	Shamkir rayon, Seyfali village
Type	The center with a clay core and rock-stone casting type
Height	150 m;
The width from the top	12 m
The length of its eyebrow	692 m
Water reservoir:	
The territory of surface part of water	3.985 km²;
The length of the lake	6.153 km
Total water capacity	170 mln.m³;
Beneficial volume	145 mln.m³;
Hydroelectric Power Station	24.438 mvt
Accidental water discharge mechanism:	
Type	circular sectional;
Efficiency	697 m³/sec;
Diameter	6 m;
Length	765.53 m;
Energy (compressed) water discharge mechanism:	
Type	circular sectional;
Water discharge capacity	28 m³/sec;
Diameter	4.5 m;
Length	884.85 m;
Irrigated areas:	
A) The areas under strengthening of water supply	50122 ha;
B) Planned areas for irrigation	20834 ha;
Approximate cost	400-450 Mln AZN(430Mln Euro);

A. Tovuzchay Water Reservoir

B. (Under construction, to be completed by end of 2014 beginning of 2015)

TECHNICAL AND ECONOMIC PARAMETERS

Dam /Location:	Tovuz rayon, Vahidli village
Type	The center with a clay core
Height	45 m
The width from the top	10 m
The length of its eyebrow	1340 m;
Water reservoir:	
The territory of surface part of water	160 ha
Total water capacity	20 mln.m³;
Beneficial volume	18 mln.m³;
The length of reservoir	2.6 km
Water Discharge Mechanism	
Type	Iron concrete pipe - b x h = 3.5x3.5 m;
Diameter of inner pipe	d = 3000 mm
Operational flood efficiency	125 m³/san;
Length	273 m
Accidental water discharge mechanism:	
Type	open trench
Efficiency	250 m³/san;
Major flood efficiency	410 m³/san
Testing flood efficiency	502 m³/san;
Length	627 m;
Irrigated areas:	
A) The areas under strengthening of water supply	18465 ha;
B) Planned areas for irrigation	1660 ha;
Approximate cost	50-60 Mln AZN(55Mln Euro);

C. **Water reservoir planned for reconstruction**

Gankachay Water Reservoir	
Total water capacity	42 mln.m³;
Improvement of water supply of lands	7954 ha
Approximate cost	100-120 Mln AZN(1030Mln Euro);
Zayamchay Water Reservoir	
Total water capacity	115 mln.m³;
Irrigated areas:	
A) The areas under strengthening of water supply	9900 ha;
B) Planned areas for irrigation	4600 ha;
Approximate cost	300-350 Mln AZN(325 Mln Euro);

D. Rain water reservoirs planning to be constructed (in Shamkir rayon)

N	Title of water reservoirs		Total capacity, mln m³ m/ approximate cost(Mln AZN)	Total capacity, mln m³	Water surface territory, ha	Height of dam
1	Cayari		3,5/8	3,5	26	9
2	Goygol	*rai*	6,6/15	6,6	44	12,5
3	Morul-Alpoud	*ra*	0,01/0.02	0,01	2,5	4
4	Dallar-Cayir	*ra*	0,11/030	0,11	21,5	5
5	Dallar-Cırdakhan	*ra*	0,12/030	0,12	6	9

ANNEX 14. Description of the economic situation in Central Kura BD

Agstafa rayon

Geographic area – 1503,7 km²

Population – 83 690 (01.01.2014)

Main natural resources - saw stone, colloidal clay, gravel, sand, cement.

Main economic subjects – 132 offices, enterprises and organizations, 5 bank branches, 2 credit unions, 4 hotels.

General production for the rayon in 2013 was 128,1 million AZN (13,2% growth). The growth was 4,1% in agricultural production, 36,3% in construction activities, 16,6% in communication services and 0,9% in commerce and trade. Overall investments made in the economy of the raion were 53,5 million. AZN (15,1% growth). Average nominal monthly salary was 226 AZN.

Dashkesen rayon

Geographic area – 1047 km^2

Population – 33653

Main natural resources – gold, copper, cobalt, iron ore, limestone, granite and marble.

General production for the raion: 56,57 million AZN, particularly:

- Industrial production - 5, 638 million AZN
- Agruculture – 26, 367 million AZN

Overall investments made in the economy of the raion were 9,612 million AZN. The biggest production enterprise within the raion is Dashkesen Ore dressing Factory with annual capacity of 1 million tons of iron ore concentrate. 350 people work in this factory. Also new plant is under construction for exploration of Chovdar gold mine.

Tovuz rayon

Geographic area – 1942 km^2

Population – 166 400

Main economic sector – agriculture

Main economic subjects – 235 offices, enterprises and organizations 9 bank branches, 2 communication organizations, 3 hotels.

Gazakh rayon

Geographic area – 692 km^2

Population – 92850

Main economic sector – agriculture

Main economic subjects – 26 industrial enterprises, 7 bank branches, 5 credit organizations, 2 communication organizations, 3 hotels.

Gazakh is mainly agricultural raion. Grain-growing, vine-growing and cattle-breeding are most commonly developed spheres. 66,4% or the 53828 ha land plot are arable lands and 26,3% or 21 334 ha of this figure

makes plantations. General production in 2013 was 141 107.2 AZN, overall investments contributed into the economy were 33,88 million AZN, overall production in agriculture was 51 805.3 AZN, average nominal monthly salary was 228 AZN.

Shamkir rayon

Geographic area – 1660 km^2

Population – 204120

Main economic sectors – agriculture, food processing industry, construction and commerce.

Main agricultural spheres– grain-growing, vine-growing, potato growing, gourd cultivation, vegetable-raising, wine-making, plant-raising and cattle-breeding.

Main economic subjects – 181 offices, enterprises and organizations, 23 private banks and 2 communication units.

Shamkir rayon is also mainly based on agriculture and food processing industry. Overall production in 2013 was 565 658 000 AZN. Production per capita was 2770 AZN. There are 18 industrial enterprises and 7515 greenhouse facilities with the total area of 1515 hectares in the raion. 22219 hectare area is mainly planted with grain products. Average nominal monthly salary was 312 AZN.

Gadabay rayon

Geographic area – 1232,98 km^2

Population – 96886

Main economic sectors – agriculture, iron and copper ore dressing industry, construction and commerce.

Main natural resources – iron, copper, gold etc.

Main agricultural spheres – grain-growing, potato growing, fishery and cattle-breeding.

Gadabay rayon is mainly based on agriculture and partly iron and copper ore production and dressing facilities. General production for the raion in 2013 was 294 139 000 AZN (6,9% growth). The growth was 4,9% in agricultural production, 290 % in construction activities, 12,7% in commerce and trade, 12,2% in services, 17,5% in information and communication services and 3,4% in transport.

Ganja city

Population of Ganja city exceeds 323 thousand.

Industrial production in Ganja is close to 200 Mln AZN.

Ganja is a city of an auspicious geographical position on the Great Silk way.

In the XVII- XVIII centuries Ganja started to play an important role in the international trade, as well as social-economic and cultural life of the country. During that period trade and craftsmanship took an important place because of a crucial economic potential for development of craftsmanship in the city. Craftsmen's source of raw materials was the iron, copper, aluminous and other ore mines near to Ganja. As Ganja became a large center, its territory also expanded parallel to it, new commercial and industrial objects were constructed. It silk and silk products won the sympathy of not only local customers, but also foreign ones. The XII- XIII centuries can be underlined as the flowering period of Ganja which was the second capital of the state Atabeks. The fabric named «Ganja silk» which was in this city was highly appreciated in the neighboring countries and the Middle East (David A. Chin, 2006).

The study region has a strategic position. Thus, the transport corridors connecting Europe and Asia pass through the area.

Goygol rayon

Geographic area – 935,7 km^2

Population – 60 900

Main economic sectors – agriculture, partly tourism.

Main agricultural spheres – grain-growing, wine growing and cattle-breeding.

Goygol raion is also mainly agricultural region. The region has favorable natural conditions and beautiful nature that gives the potential for development of tourism sector. 15800 hectare area or 17,3% of the total area are covered with forests. Overall figure of arable land plots amount to 62104 hectares. Goygol Lake and 7 lakes around it having the same origin are located within the raion.

Total area of grain plantations are 9019 hectare, potato plantations – 1018 hectare, vegetable plantations – 713 hectare, vine plantations – 1016 hectare.

Samukh rayon

Geographic area – 1450 km^2

Population – 53 400

Main economic sectors – agriculture.

Main agricultural spheres – grain-growing, vegetable growing, gourd growing, sunflower growing and cattle-breeding.

Samukh rayon is mainly focused on agriculture. Arable land plots amount to 20958 hectare. Wine plantations of 1115 hectare and fruit gardens of 1084 hectare are cultivated. Also 9 industrial enterprises are producing several products within the raion.

Total production is 79 million AZN, particularly 41,9 million AZN or 53,0% for agriculture, 4,9 million AZN or 6,2% for industrial production, 15,8 million AZN or 19,8% for construction, 2,0 million AZN or 2,5% for transport services, 0,4 million AZN or 0,5% for communications and 14,2 million AZN or 18,0% for trade and commerce.

ANNEX 15. Information on the solid waste situation in the Central Kura BD

Ganja City

According to the Grant Project financed by the German KfW Development Bank the consultant company (ERM GmbH) conducted detailed Feasibility Study for Eco-friendly integrated waste management in Ganja city. Based on the calculations made by the consultant total waste generated for the year is estimated **107 000 – 110 000 tones. 75-80%** of the total waste is collected by the Cleansing Department of Ganja city Executive Power and disposed off in the main dumpsite at Baku Road, just 2 km from the eastern gate of Ganja city. The site has been used for more than 40 years and the area in general is allocated for waste activities in town planning. One of the environmental impact problems is that the site is generally open and exposed to frequent strong winds.

Currently 2 old dumpsites at Baku Road at the outskirts of Ganja are in operation. The first one is covering area of **15 ha** and it is estimated that there are about **150 000 – 200 000 m^3** visible waste. The second dumpsite is **0,5 ha** area and visible uncovered waste is estimated **10 000 m^3.** A third dumpsite is located in Sadilli District close to the Airport Road in a distance of 3 km from the airport. The area is about **3-4 ha** and the waste amount is estimated at **70 000 – 100 000 m^3.**

According to manual sorting and weighing of waste samples in mid-March 2012, the waste composition is as follows in Table 4.11.

Table 4.11. Waste composition in Ganja (in % by weight)

Waste type	Percentage
Organic	55%
Paper and Cardboard	8%
Plastic	8%
Metal	2%
Glass	3%
Other	24%

For the solution of waste management problems in Ganja city the Government of Azerbaijan is planning a new Project – Eco-friendly integrated solid waste management project together with German KfW Development Bank. Main activities within the project are assumed as the following:

- ✓ Replacement of waste storage, collection and transportation equipment and trucks with new and modern ones and improve collection system;
- ✓ Construction of new sanitary landfill in accordance with international environmental standards;
- ✓ Closure of 3 main and little illegal dumpsites;
- ✓ As a pilot, improvement of medical waste management system;
- ✓ Public awareness and capacity building measures.

The project is planned to start in 2015.

Naftalan city

Geographic area – 2 km^2

Population – 9400

Solid waste management is within the responsibility of Executive Power. Service is provided for the whole city and collected waste is disposed within city landfill. 3 waste transportation trucks, 4 pressing trucks and one excavator is in operation, but most of them are outdated and need replacement.
Photos of Naftalan city landfill

Figure 24. Wiew oflanffil inNaftalan

Tovuz rayon
Geographic area – 1942 km^2
Population – 164 000

Solid waste management is within the responsibility of Executive Power. Service is provided for Tovuz and Govlar cities. According to the information from Executive Power, total waste generation for both cities is about 145 tons/day. The landfill is located about 10 km from Tovuz city and has an area of 3 hectares. The Executive Power has 8 trucks in Tovuz and 3 trucks in Govlar.

Dashkesen rayon

Geographic area – 1047 km^2

Population – 33500

Solid waste management is within the responsibility of Executive Power. Estimate for daily waste is not available. The Executive Power has designated 13 collection points in the city with 5-6 trash bins at each collection point. Waste is collected daily, but Executive Power does not have its own equipment. Trucks are leased from nearby town.

Another type of wastes is generated due to operation of Dashkesen Iron Ore facility. Wastes from production are disposed in special pools. The main waste pool is in Goshgarchay (Goshgar River) valley. There is no data on water used in iron ore production and disposed into waste pool.

raion

Geographic area – 692 km^2

Population – 92850

Solid waste management is within the responsibility of Executive Power. Estimate for daily waste is not available. The waste collected is disposed into the area near to Agkoynak-Garapaphag village. Proximity to the village is one of the big health problems. Waste is disposed in uncontrolled manner, not covered and the area is not fenced.

Figure 25. Waste dumping site in Agkoynak-Garapaphag village

Goygol rayon

Geographic area – 1030 km^2

Population – 60 000

Solid waste management is within the responsibility of Executive Power. Estimate for daily waste is not available. The waste disposal site is located in Ganjachay basin, 1,8 km far from right bank of the river, adjacent to Mollakhalilli village. Total area of the landfill is 1 ha. Waste is disposed in uncontrolled manner, not covered and the area is not fenced.

Samukh rayon

Geographic area – 1450 km^2

Population – 53 400

Solid waste management is within the responsibility of Executive Power. Estimate for daily waste is not available. The waste disposal site is located in Nabiaghali district far from the city. Data on amount of the waste generated is not available.

Goranboy rayon

Geographic area – 1760 km^2

Population – 108792 (including 992 internally displaced people)

Solid waste management is within the responsibility of Executive Power. Estimate for daily waste is not available. The waste disposal site is located 20 km from Ganja city, in the area called Antique Ganja. Data on amount of the waste generated is not available.

Information on Shamkir, Agstafa and Gadabay raions is very limited.

Generally, waste management services are of poor quality and don't cover the entire areas and population. Therefore, in some areas not covered with waste collection services waste is directly disposed into rivers and water basins, thus polluting water resources and causing severe environmental and health impacts. Also, lack of fencing, leachate collection and other modern standards in operated waste dumping sites cause the pollution of air, land and ground waters.

Future development plans on sector improvement:

Government of Azerbaijan is planning the preparation of National Solid Waste Management Strategy and Action Plan based on regional cooperation between the administrative raions. Within the Integrated Solid Waste Management Project implemented together with the World Bank, the following tasks are expected in the framework of National Strategy:

Information and Data gathering. This will include:

- Desk study on Existing Conditions
- Data collection with the following information relative to each districts in the region:
    - Waste generation data.
    - Collection, Treatment, and Disposal Service Characterization.
- Institutional Responsibilities and Capacity.
- Existing Budgets and Financial Resources.
- Waste Characterization Studies/surveys.

Deficiencies Assessment – Based on the above activities, a deficiencies analysis which will include consideration of existing SWM deficiencies associated with 1) service provision, management and technical deficiencies, 2) economic/financial deficiencies and 3) institutional and capacity deficiencies will be conducted.

Annex 16 General information on planning of small hydropower plants in the near future within the Central kura BD

District	River	№ HES	Power (MVt)	Water consumption m^3/s	Head, netto, m	Length of pipe km.	Diameter m
Goygol	Ganjachay	GQG-1	2,0	4,57	149,60	1x1,30	2,00
		GQG-2	3,4	4,57	84,40	1x1,25	2,00
		GQG-3	3,0	4,57	74,40	1x1,10	2,00
		GQG-4	2,8	4,57	69,50	1x1,15	2,00
	Qoshkarchay	GQG-5	4,0	1,90	99,30	1x1,30	1,00
		GQG-6	4,0	1,90	99,30	1x1,45	1,00
		GQG-7	3,0	1,90	74,40	1x1,05	1,00
		GQG-8	3,0	1,90	74,40	1x1,20	1,00
Total: within Goygol		8	25,2				
Agstafa	Agstafachay	GQA-1	2,8	10,70	29,60	1x1,40	1,20
	Jogazchay	GQA-2	0,9	0,95	107,10	1x1,20	0,80
Total: within Agstafa		2	3,7				
Tovus	Tovuzchay	GQT-1	1,8	1,50	145,20	1x0,7	0,80
		GQT-2	4,0	2,50	181,80	1x0,,95	0,80
		GQT-3	3,2	2,00	180,80	1x1,05	0,80
	Akhinjachay	GQT-4	1,5	2,91	58,40	1x1,15	1,20
Total: within Tovuz		4	10,5				

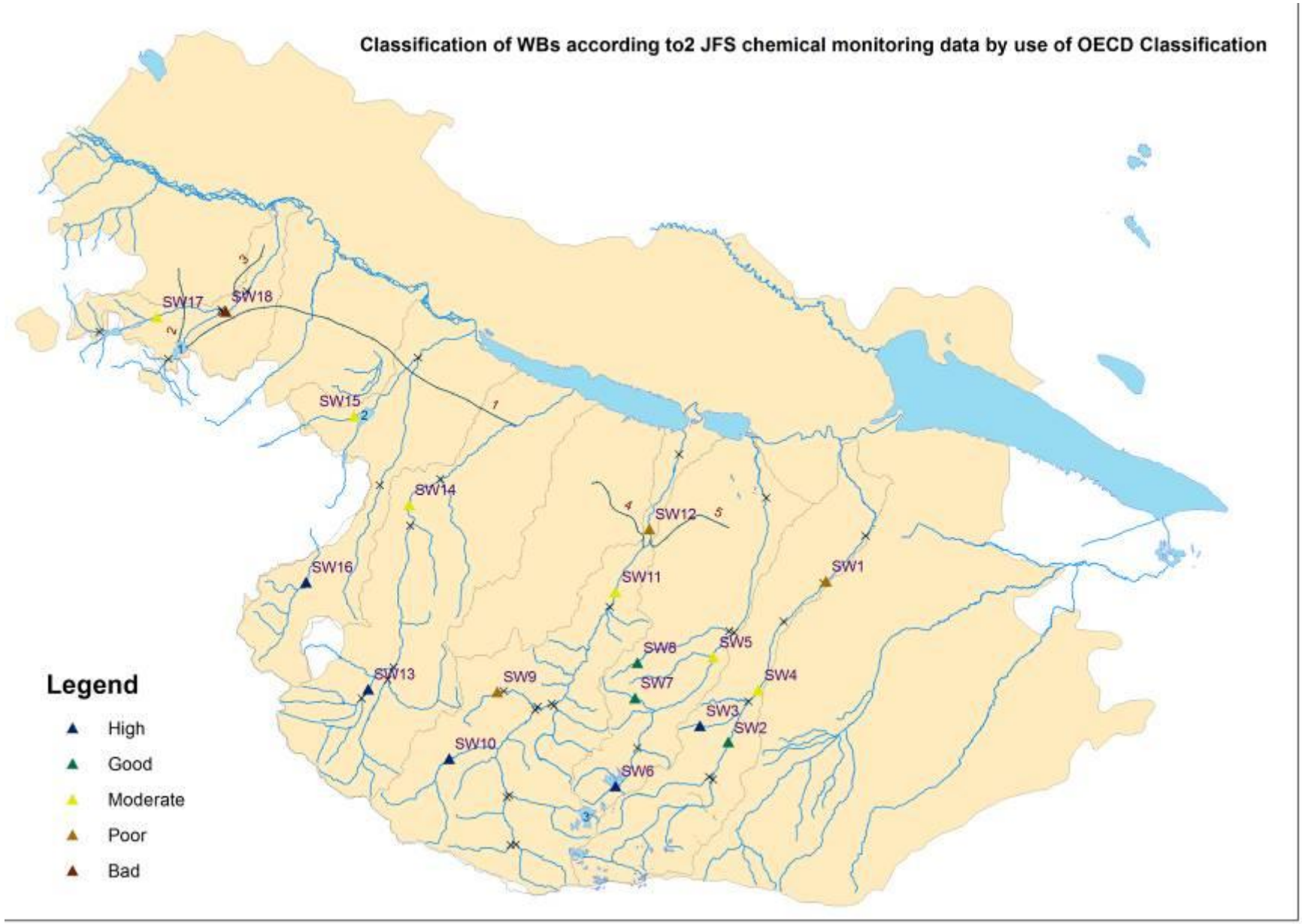
Shamkir	Shamkirchay	GQŞ-1	4,0	4,46	155,60	1x1.14	1,20
		GQŞ-2	0,8	2,46	36,90	1x0,90	2,00
	Zayamchay	GQŞ-3	3,6	5,59	72,90	1x1,35	2,00
		GQŞ-4	5	5,59	101,30	1x1,40	2,00
		GQŞ-5	5,0	5,59	101,30	1x1,00	2,00
		GQŞ-6	5,0	5,59	101,30	1x1,20	2,00
Total: within Shamkir		6	23,4				
Goranboy	Kurakchay	GQK-1	4,8	3,50	154,80	1x1,10	1,50
		GQK-2	3,0	2,83	120,00	1x1,20	1,20
		GQK-3	3,0	2,83	120,00	1x1,25	1,20
	Goranchay	GQK-4	3,0	2,33	120,00	1x1,20	1,20
		GQK-5	3,0	2,33	120,00	1x1,10	1,20
		GQK-6	2,3	2,33	92,00	1x1,15	1,20
		GQK-7	2,3	2,33	92,00	1x1,30	1,20
		GQK-8	2,2	2,33	88,00	1x1,35	1,20
		GQK-9	2,0	2,33	80,00	1x1,40	1,20
		GQK-10	1,4	2,33	56,00	1x1,30	1,20
-	Indjachay	GQK-11	3,4	2,87	129,80	1x1,20	0,80
		GQK-12	3,0	2,87	124,50	1x1,15	0,80
Total :within Goranboy		12	33,4				

Total: Ganja-Gazakh zone		32	96,2				

ANNEX 17.Classification of WBs according to2 JFS chemical monitoring data by use of OECD Classification

CODE:	RIVER NAME:	PLACE:	Class
SW-1	Ganjachay	Zazali	Bad
SW-2	Ganjachay	Zurnabad	Good
SW-3	Mirzikchay	Shehriyar	Good
SW-4	Ganjachay	Topalhasanli	Modeate
SW-5	Qoshqarchay	Yalqishlaq	Moderate
SW-6	Qoshqarchay	Khoshbulaq	High
SW-7	Gushchuchay	Gushchu	Good
SW-8	Jovdarchay	Jovdar	Good
SW-9	Gadabaychay	after Gadabay	Poor
SW-10	Shamkirachay	Qalakend	High
SW-11	Shamkirchay	Mehrili	Moderate
SW-12	Shamkirchay	Chinarli	Poor
SW-13	Vocanchay	Chobankend	High
SW-14	Zayamchay	Yaniqli	Moderate
SW-15	Tovuzchay	Oysuzlu	Moderate
SW-16	Axinjachay	Qaralar, before AM border	High

CODE:	RIVER NAME:	PLACE:	Class
SW-17	Jagazchay	Alpod	Moderate
SW-18	Agstafachay	Qazakh-Bridge	Poor


Classification of WBs according to2 JFS chemical monitoring data by use of OECD Classification
SW17
SW18
SW15
SW14
SW12
SW16
SW11
SW1
SW8
SW5
SW13
SW9
SW7
SW4
SW3
SW2
SW10
SW6
1
2
3
4
5
Legend
High
Good
Moderate
Poor
Bad

Annex 18. Water quality data for year 2013(based on measurements during 12 months of the year) and maximum concentrations during the year

River	Station	Average and maximum concentration of elements in 2013											
		BOD5		NO_2^-		NH4		total ammonium		total phosphorus		Fe	
		Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax
		mq/l		mq/l		mq/l		mq/l		mq/l		mq/l	
Akstafachay	Musakey	2,07	2,60	0,009	0,018	0,1686667	0,254	0,178	0,261	0,197	0,197	0,18	0,28
Akstafachay	Qazach(02)	2,54	3,91	0,011	0,024	0,23325	0,328	0,244	0,334	0,168	0,168	0,17	0,31
Ganjachay	Zurnabad	1,99	2,09	0,006	0,011	0,1723333	0,289	0,179	0,300	0,099	0,099	0,09	0,18
Tauzchay	Agdam	1,70	2,09	0,003	0,004	0,0976667	0,132	0,101	0,135	0,128	0,128	0,07	0,09
Tauzchay	Tauz(02)	1,90	2,25	0,007	0,020	0,0876	0,123	0,113	0,128	0,247	0,247	0,08	0,13
Shamkirchay	Shamkir	1,76	1,88	0,009	0,001	0,216	0,084	0,222	0,087	0,141	0,141	0,09	0,02
reservoir Akstafachay	Musakey	3,05	4,59	0,009	0,015	0,23675	0,42	0,246	0,424	0,444	0,444	0,28	0,43

River	Station	Average and maximum concentration of elements in 2013											
		Pb		Cu		Ni		V		Mo		Co	
		Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax
		mkq/l		mkq/l		mkq/l		mkq/l		mkq/l		mkq/l	
Akstafachay	Musakey			11	14								
Akstafachay	Qazach(02)			8,7	11,7	5,7	5,7	4,3	4,3	4	4	6,4	6,4
Ganjachay	Zurnabad			3,5	5								

Tauzchay	Agdam			6,5	8							
Tauzchay	Tauz(02)			4,7	8							
Shamkirchay	Shamkir			3,7	6							
reservoir Akstafachay	Musakey			11	20	4,4	4,7	3,9	4,1		5,8	5,9

River	Station	Average and maximum concentration of elements in 2013											
		Al		Sn		Mn		Ti		Bi		Zn	
		Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax	Qav.	Qmax
		mkq/l		mkq/l		mkq/l		mkq/l		mkq/l		mkq/l	
Akstafachay	Qazach(01)												
Akstafachay	Qazach(02)	2,5	2,5			2,9	2,9	3,6	3,6	1,8	1,8	8,85	9,4
Ganjachay	Zurnabad												
Tauzchay	Tauz(01)												
Tauzchay	Tauz(02)											3,1	3,1
Shamkirchay	Shamkir												
reservoir Akstafachay	Musakey	2,3	2,3			2,6	3,1	1,7	2	0,5	1	8,2	8,8

Annex 19. Results of analyses of water quality monitoring carried by MENR in 2013 at Annex monitoring sites

CODE:	RIVER NAME:	PLACE:	Classification by existing system(pollution index)	OECD Classification
1	Ganjachay	Zurnabad	Good	Good
2	Goshgarchay	Sarkar	High	Good
3	Goshgarchay	Garabulaq	Good	Moderate
4	Shamkirchay	Galakand	High	Good
5	Shamkirrchay	Shamkir	Moderate	Poor
6	Tovuzchay	Agdam	Good	Moderate
7	Tovuzchay	Tovuz	Moderate	Poor
8	Agstafachay	Musakey	Moderate	Moderate
9	Agstafachay		Poor	Poor

Annex 20. Trends of key climatic and socio-economic drivers in Central Kura Basin District

Socio - Economic trends

Geographic overview of the Basin Dsitrict is given in chapter 2.1.
As of January 1st, 2015, the population of Ganja-Gazakh Economic region is 1240418 (that means 13078 or 1,1% percent more comparing with the relevant period of last year).
Dynamics of increase of number of population during last 10 years is shown at tablebelow

Table . Dynamics of increase of number of population

Population	**2005**	**2009**	**2010**	**2011**	**2012**	**2013**
Number of population at the end of the year(thousand persons)	1138,0	1179,9	1191,7	1205,2	1216,1	1227,5
Annual increase	10554	10441	12474	14144	11932	12015

Labor force makes 797 300 persons. There are 9 raions, 2 cities, 287 municipalities in the region.
Administrative rraions are: Aghstafa, Dashkasan, Gadabay, Goranboy, Samukh, Tovuz, Gazakh, Goygol, Shamkir raions, Ganja and Naftalan cities.
The main sectors of economy are agriculture, food processing and light industry and handicraft. The region is rich of some natural resources as iron ore, copper, gold, silver, aluminum, limestone, marble, gypsum, collide, cement, etc. Especially iron ore and gold resources in Dashkesen, aluminum resources in Zeylik, limestone resources in Khoshbulag and gold, silver and copper resources in Gadabay are of economic importance. The part of Kura River flowing through the region has abundant hydro energy recourses. The economic region also has rich natural-recreational recourses.
During 2005-2013 industry production in the region has increased from 170 Mln. AZN to 305 Mln AZN, Average monthly wages from 88 AZN to 331 AZN.

Agriculture development

Area sown for agricultural products during 200-2012 has increased from 116389 to 197525 ha

Livestock play one of the important roles in this economic rayon. In 2012 year, the quantity of large horned livestock was 366,1 thousand, sheep and goats was 1835,9 thousand, birds was 2,5 million and these figures are almost 2 times higher than those of in 2000.

It must be added that, in Ganja-Gazakh economic region there is large capacity for development of viticulture, potato production, vegetable production, dry subtropical fruit production, melon and gourd production, horticulture, grain production, cattle-breeding.

In addition to them cotton and tobacco production may also been developed.

Crop yields and production area in Ganja- Gazakh region is also slowly growing and currenntly area under crops makes 101972 ha and total crop production makes 322418 ton.

Animal husbandry is also being developed in the study area, particularly in the mountainous and partly plain segments of the area.

Agricultural production has impact on both quality and quantity of water resources. As mentioned above huge majority of abstracted waters are used for irrigation. Impact of agricultural crop production and livestock on quality of water is also important issue.

It should be noted that, there is a pesticides and fertilizers (nitrogen and phosphorus) storage between Goygol and Ganja city. Currently fertilizer is not produced in the country and imported from the foreign countries. In 2012 was started construction of mineral fertilizers plant with a large capacity.

But in vineyards and also in process of growing of many types of vegetables some fertilizers and chemicals are used and therefore they can be considered as sources of **significant impact** to the state of waters of the pilot region. This also is approved by water quality information for basin rivers.

Industry and mining

Industrial extraction of ore in this region has been begun since 1954. There was constructed aerial cableway with the length of 4 km for transportation of ore extracted from the iron ore field. After Azerbaijan gained independence there was constructed large metallurgical plant in Ganja.

After period of economical crisis "Dashkesen filizsaflashdirma" JSC was established (2007), which began production of iron ore only in august of 2010. The mining capacity of the plant is 40-50 thousand tons of iron ore per month.

It's planned to increase the annual production capacity of "Dashkesen filizsaflashdirma" JSC up to 500 thousand and then up to 1 million tons, after Steel workshop of the newly constructed Aluminum plant will be operational.

Forestry

There are 2 kinds of forest in the territory: mountainous forests and plain forests. The area of forest is 0.35 km^2 in Agstafa river basin, 101 km^2 in Ganja river basin, 11 km^2 in Gosgar river basin and 78 km^2 in Tovuz river basin (figure 2.8).

The main part of the forests is in the riparian forest area (flood plain forest/Tugay forest). The species of plants and birds names of which are included into the Red Book are under protection in the Garayazi National park established in this territory.

As forests play significant role in combating of desertification and also in flow conservation therefore there is need to increase forest areas in all pilot river basins.

Tourism

Favorable climate conditions, clean air, mountain and forest landscape, therapeutic mineral water resources allows to create international health resorts for treatment and recreation. There are Goy-Gol and Hajikend recreation areas here at the height of 1566 m above the sea level. There is a well known Naftalan medical sanatorium in this area. Naftalan is the only recreational center in the world with therapeutic oil reserves. With the population of 8000 people Naftalan is situated in Goranboy rayon which is in 320 km from Baku and has 50 km distance with Ganja.

The city is called from the name of the field with the same name Naftalan. Absence of harmful vapors gasoline and kerosene, availability of valuable lubricant oils, absolute purity and rather significant specific weight (0,930-0,960) distinguish Naftalan oil from other types of oil. The Naftalan oil is applied with huge success in almost all areas of medicine at the moment. Naftalan is a good mean for treatment of wounds, skin, nervous,

urological and gynaecologic diseases, liver etc. The five star hotel "Ayan Palace" with capacity of 700 people which is one of the largest tourist facilities in the region was recently opened in Tovuz.

Water use trends in Ganja-Gazakh region

Total water abstraction trends

In total year by tear water abstraction increases in the Basin District and two third of the total water resources are abstracted for different purposes. More than 30% ob abstracted water goes to losses(see table below)

Table . Water consumption in Ganja- Gazakh economic region (million m^3)

Water abstraction	**2005**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Waters taken from natural sources, million m3.	797	900,6	940,0	948,1	945,7	1072,9	1131,4
Water for irrigation and agriculture	544,8	715,0	705,8	718,3	765,4	808,1	842,1
Water lost during transportation- million m3	197	253,2	262,2	261,3	244,5	299,5	144,9

Main increase has takenlace in the area of irrigation water use due to increase of irrigated areas.

Water supply and waste waters

Amount of water used for drinking and production purposes hasn't increased, but volume of waste waters has increased more than 2 times

One of the reason for this is rehabilitation of WSSS of rayon centers in last years. Increase of control of amounts of water supplied to population through installation of meters and other tariff instruments lead to reduction of water use. Rehabilitation of sewage systems lead to increasing of volume of transported waste waters.

Regional office of Azersu informed that drinking water for Tovuz region now is being abstracted from drainage in Zayamchay riverbed. Water supply and sanitation system of Tovuz is rehabilitated now and around 80000 AZN is spent(40% for water supply system and 60% for sanitation system).

Drinking water for Shamkir and part of Ganja city will be used from Shamkirchay reservoir according to government new National WSSS rehabilitation program.

In other rayon centers of the region improvement of WSSS is planned to be carried by government currently.

Industrial water use is around 10 million m^3. .Industrial water use in the region is smaller than water use for irrigation. Abstracted water discharges from most of region rivers are significantly less than those of irrigation water use.

It is also hard to see if there is any trend in industrial water use by time. From one side increase of numbers and capacity of industries may lead to increase of water demands by the sector and from the other side reforms undertaken towards efficiency water use require reduction of water use by different sectors by applying of good practices and technologies. Role of tariff increase in recent years also is high in this regards.

As tariff for industries are higher than to individual population and as this figure can be raised after relevant cost effectiveness assessment of water supply for industry from qualitative and quantitative point of view.

Irrigation water use

Total volume of irrigation water use in 2013 made 842,1 mln m^3 which is over 50% higher than one used in 2005. Significant annual increase of amount of irrigation water use is ongoing in all of raions of the region which is connected with rapid development of agriculture..

Irrigation water supply in the region is carried by use of different canals, which start from constructed in the pilot region 6 water reservoirs. Main reservoirs of the pilot area are Agstafachay(120 mln. m^3) , Akhinjachay(14 mln. m^3) , Jogazchay (20 mln. m^3). There are also several acting canals on Ganjachay river .

In conclusion it should be noted that water use for irrigation has high impact on quantity of water resources of all pilot rivers of the Gazakh- Ganja region.

High level of water use for irrigation lead to significant reduction of the flow or drying(in summer) of rivers in the region, which is huge problem for assessment of status of water bodies according to EU WFD. Environmental flow requirements aren't given attention in low flow period.

Maybe construction of water reservoirs(with facilities to keep river continuity) can play positive role in process of provision of all year around water in the river, but from the other side it ends with heavily modification of water bodies and appearance of artificial water bodies. Therefore the process of construction of new irrigation infrastructure should be based on thorough study of the situation taking into consideration of economic and environmental aspects of water management.

The water resources of the rivers should be used more rationally and quantity of environmental flow should be ensured. Parameters of some Water reservoirs are given in Annex 13

Water scarcity problem

Further development of water use, notably for irrigation, is limited by the management capacity and infrastructure and the available water. To make the most of limited water resources, management systems promoting careful use of water and good governance are needed.

The current annual water abstraction of about 80% of existing water resources of the region.. Thus, on a yearly basis, the available water supplies are not deficient compared to the demand. However, within a year, there are periods of high and low stream flows. What is lacking is the management capacity and infrastructure to capture stream flows during the high runoff period so that they are available for use during the times of shortage. Also, about 35% of the abstracted water is not consumptively used and is lost in conveyance and distribution systems.

A good assessment of the quantity and quality of water resources is made difficult due to the lack of accurate data and the fact that most of the data are not collected on a real-time basis. The last time region's surface water resources were estimated was on the basis of the information obtained in years 1972–1989, in the times of the Soviet Union. Also, the aggregate numbers describing water resources do not provide insight regarding variation over space and time. This variation is critical to understanding sufficiency of water resources, and where water resource availability is a problem that needs to be urgently addressed. Most data monitored are not on a real-time continuous basis; rather they are point measurements taken at some time interval. For example, the flow discharge in trans-boundary rivers is measured about once every five days. Another short coming is that the water monitoring agencies lack access to modern data management software and hardware for data processing, storage and its use in decision-making.

To regulate water demand, the water management agencies still use old "norms" to establish how much water is needed for various uses. For example, the irrigation water supplies are made on the basis of norms that have not been updated using modern algorithms based on climate and crop biology (FAO, 2006). For managing demand for water, it is important to use new data and science-based algorithms.

ANNEX 21 Implemented amd planned EPIRB pilot projects.

Pilot project 1 in Azerbaijan (PPAZ01)

Country	Azerbaijan
Name	***Assistance in preparation of secondary legislation in Azerbaijan in support of implementation Azerbaijan Water Code and approximation to the EU Water Framework Directive and Urban Waste Water Treatment Directive***
Contact person:	Rafig Verdiyev rafig2000@mail.ru
Timing	26-May-14 – 31-Mar-15
Short description	The concept of Integrated Water Resources Management is reflected in Water Code of the Republic of Azerbaijan, as are the mechanisms introduction of the principles of the EU Water Framework Directive and Urban Waste Water Treatment Directive. However to ensure their implementation requires specific decisions of Cabinet of Ministers to be agreed and drafted, and secondary legislation to be developed. The institutional framework needs to be clarified, with current overlap of fragmentation of responsibilities resolved. Toward this objective, the Ministry has requested assistance in undertaking a legal and institutional review of the existing situation; prepare draft decrees of Cabinet of Ministers on application of the River Basin Management approach and establishment of River Basin Organisations; and drafting of key secondary legislation required for application of the WFD and UWWTD. The project is divided into four phases: 1. Identification of institutional responsibilities for the application of IWRM principles at the national level and the application of WFD and UWWTD and recommendations for institutional reform. 2. Development of mechanism for application of the Basin Approach as indicated in Water Code of Azerbaijan Republic according to principles of EU WFD and preparation of a draft Decree of Government/or relevant authority on adoption of the mechanism 3. Development of a draft Decree of Government or relevant authority on creation and operation of Basin Management Organizations, including preparation Basin Management Organization charters (objectives, functions, status and composition). 4. Development of mechanism for the application of the Urban Waste-Water Treatment Directive in Azerbaijan
Outputs	Inception report: Review of institutional structure for application of IWRM and EU WFD and next steps: Report on River Basin Management in accordance with IWRM and WFD and draft decrees of Cabinet of Ministers: Report on secondary legislation and development of key legislation for application of WFD and

	UWWTD: Final report:
Photos	 Discussion of RBMP development for Central Kura Basin district according to WFD principles in Ganja, 23 April 2015

Discussion of pilot projects, including those related to development of secondary legislation on application of EU directives, in Baku, February 2015,

Pilot project 2 in Azerbaijan (PPAZ02)

Country	Azerbaijan
Name	***Water resource use studies in selected transboundary tributaries (Zayamchay and Goshgarchay) in the pilot basin combing IWRM and WFD objectives through establishment of environmental flows and EQOs***

Contact person:	Rafig Verdiyev rafig2000@mail.ru
-Timing	01-Sep -15 – 29-Feb-16 .
Short description	The concept of Integrated Water Resources Management is reflected in Water Code of the Republic of Azerbaijan. Mentioned two rivers located in project pilot region aren't included to the list of selected rivers for which RBMPs are been developed by EPIRB project. Therefore in this pilot project more detailed analyses of water uses, pressures and impacts in Zayamchay and Goshgarchay rivers basins will be carried and also there will be combing IWRM and WFD objectives through establishment of environmental flows and EQOs. The final product will be detailed water resource/RBMP plans. The project is divided into six phases: 5. Collection and collation of information and data on state of water resources of the river, water users, impacts on the surface and groundwater bodies relating to anthropogenic pressures (hydromorphological alterations, point/diffuse source pollution, from agriculture/irrigation, mining, industry, wastewater, energy generation, pollution by hazardous substance etc.) at the water body level. 6. Assessment of water demand and supply 7. Assessment of ecological flow and establishment of environmental objectivities 8. Economic analyses 9. Develop programmer of measures , including preparation of proposal on construction of water reservoir near river to regulate water resources *10. Development of IWRMP for Zayamchay and Goshgarchay rivers*
Outputs	Inception Report: Report on status of water resources and their use and supply: Programmer of measure: IWRMP for Zayamchay and Goshgarchay rivers: Final Report:
Photos	

Pilot project 33. Implementation of EU Flood Directive in Zayamchay River sub-basin (Central Kura Basin District) on the territory of Azerbaijan

The main objective of the pilot project will be assisting to the key project beneficiary institutions: Ministry of Ecology and Natural Resources, State Water Agency of the Ministry of Emergency Situations, Amelioration

JSC, Azersu JSC, Local Authorities in the pilot river basin (sub-basin) through the implementation of EU Flood Directive in the Zayamchay River Sub-basin that will contribute to the implementation of the selected Programme of Measures (PoM) for the Central Kura RBMP through the EU Flood Directive .

Folloüing üor has been carried in the project:

- First step: Preliminary Flood Risk Assessment, which will consider impacts on human health and life, the environment, cultural heritage and economic activities;
- Second step: Risk Assessment: information in this assessment will be used to identify the areas at significant risk which will then be modeled in order to produce flood hazard and risk maps. These maps will include the details on flood extent, depth and level for three risk scenarios (high, medium and low probability);
- Third step: Flood Risk Management Plans: these are meant to indicate to policy makers, developers, and the public the nature of the risk and the measures proposed to manage these risks. The management plans are to focus on prevention, protection and preparedness. Also, flood risk management plans shall take into account the relevant environmental objectives of Article 4 of Directive 2000/60/EC.

Pilot project 4. Refurbishment of Gazakh Regional Laboratory of MENR of Azerbaijan Republic

The Gazakh Regional Laboratory of the MENR needs primarily be equipped for analysing the 'more traditional' parameters. Actually, many of them are significant as WFD's General conditions, supporting the biological quality elements.

In Gazakh laboratory currently an old spectrometer is used to analyze the nitrogen and phosphate. Total N and P isn't determined because of luck of methodology.

In the result of the rehabilitation program neü equipment üas purchased and installed in Gazalh Laboratory of MENR and training provided to laboratory staff to use the new equipment properly

Pilot project 5. Support to finalise National Water Strategy of the Republic of Azerbaijan

This assignment contributed to the development of Azerbaijan National Water Strategy, 2 drafts of which already üere developed by support of UNECE and ADB needed to be finalized . National Consultant contracted worked with relevant National and EPIRB project experts and combined these 2 drafts together and developed final one and e submitted it to the government of Azerbaijan Republic for adoption.

Pilot Project 6. Refurbishment of Groundwater Monitoring Network in Central Kura pilot Basin District of Azerbaijan

As result of this pilot project had been refurbished (cleaning and restoration of the boreholes and etc) about 25 groundwater monitoring sites in the basin in order to conduct field GW observation to collect more accurate information on the GW level, quality, level of their exploitation and at the same time improve decision-making on water allocation.