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## ACRONYMS

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<tr>
<td>BOD</td>
<td>Biochemical Oxygen Demand</td>
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<tr>
<td>COD</td>
<td>Chemical Oxygen Demand</td>
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<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>EMIC</td>
<td>Environmental Monitoring and Information Center</td>
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<td>EU</td>
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<td>ha</td>
<td>Hectare</td>
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<td>HPP</td>
<td>HydroPower Plant</td>
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<td>IWRM</td>
<td>Integrated Water Resources Management</td>
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<td>MEINR</td>
<td>Ministry of Energy Infrastructures and Natural Resources</td>
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<td>Ministry of Nature Protection</td>
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<td>NSS</td>
<td>National Statistical Service</td>
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<td>RA</td>
<td>Republic of Armenia</td>
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<td>RBD</td>
<td>River Basin District</td>
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<td>RBMP</td>
<td>River Basin Management Plan</td>
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<td>SNCO</td>
<td>State Non-Commercial Organization</td>
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<td>TDS</td>
<td>Total dissolved solids</td>
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<td>WFD</td>
<td>Water Framework Directive</td>
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<td>WRMA</td>
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<td>Water User Association</td>
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1 ABOUT THE RIVER BASIN

1.1 Characterization of the river basin district

1.1.1 Initial conditions

The Hrazdan River basin district (RBD) is located at 900-2500m above sea level. The area covers the Hrazdan and Kasakh river basins (RB). From the north it is bordered by the Pambak mountain range, and from the north-east by the Hatis mountain massif. Gradually ascending in the south-west, it merges into the Ararat Valley. The RBD is located in the 6 administrative territories of RA- the Gegharkunik, Kotayk, Aragatsofn, Ararat, Armavir marzes and the administrative area of Yerevan.

The Hrazdan RBD belongs to the 24th "Caucasus" ecoregion (according to the division of European ecoregions developed by Ilies in 1971 and adopted under the EU water framework directive (WFD) in 2000). The RBD is a geographical area with unique natural processes. There are 4 physical-geographical subregions in the region: the Ararat valley, the western slopes of the Geghama mountain range, the Kotayk-Yeghvard plateaus, the southern slope of Aragats (Figure 1).

The Hrazdan RBD stretches in the central regions of the Republic. The total area of the RBD is 4040 km² (Hrazdan RB is 2560 km² and Kasakh RB is 1480 km²). The highest point of the surface of the river basin is 3467 m, and the lowest point is 790 m, the place of influx into the Araks River. The Hrazdan
RBD includes 20 rivers with 10 km and more length, 9 reservoirs with 1mln m³ and more storage volume, 2 comparatively large natural lakes, Khari and Akna, as well as 7 primary, 4 derivation and 7 secondary canals.

The main rivers of the RBD are Hrazdan and Kasakh with their tributaries. The Hrazdan River, a left tributary of the Araks, originates from Lake Sevan (1900 m), flows from the north-east to the south-east. The length is 141 km, the average inclination is 7.6%. The beginning of the river is considered the underground canal, which supplies water to Sevan HPP and flows 5.5 km with 70 m depth, then comes to the Earth surface near Geghamavan village. The Hrazdan River has mixed feeding, with the main source being melt water, as well as rainwater and groundwater also play a major role in feeding (51 % groundwater and 37 % melt water). The average annual discharge is 7.81 m³/s (Hrazdan-Hrazdan observation point), with a maximum of 144 m³/s.

The number of rivers with a length of 5 km or more in the Hrazdan River system is 54, of which 20 have a length of more than 10 km. Large tributaries are Marmarik, Tsakhkadzor, Dalar, Araget, Getar.

The Kasakh River originates from the southern slopes of the western part of the Pambak Range, at 2200 m altitude and flows into the Metsamor River. It has a length of 89 km. The absolute maximum runoff is 151 m³/s. The river's feeding is mixed, with the melt-rain water being dominant. The river flow is formed by the waters of the tributaries flowing from the eastern slopes of Mount Aragats and the southern slopes of the Pambak Range. The relatively large tributaries of Kasakh, which originate from the slopes of Mount Aragats, are Gegharot (length is 25.0 km, the catchment area is 66.0 km²), Shahverd (35.6 km and 162 km²) and Amberd (36.0 km and 141 km²).

The Hrazdan RBD flooding occurs in spring, and high water in summer and autumn. In the area of the RBD, river flood hazard is classified as high, according to the World Bank Global Facility for Disaster Reduction and Recovery model. The mudflows are mostly associated with heavy rainfall, which causes high water in the warmer half of the year. Mudflows of water-stone type and of average intensity are widespread in the Hrazdan river basin, especially in the rivers of Getar, Jrvezh and Voghjaberd, which are mostly formed from heavy rainfall in summer. Security measures were taken after the destruction of Yerevan city in 1946 (flooding of the city by Getar river). The Hrazdan and Getar rivers embankment were raised by 3-5 meters in the areas adjacent to the city, a regulating reservoir ("Yerevan Lake") was built in order to store Hrazdan river water during heavy rains. The Hrazdan and Getar rivers banks are regularly cleaned from solid household waste.

Two major reservoirs of Aparan and Marmarik are of special importance in the Hrazdan RBD. The Aparan reservoir was built in the Kasakh river basin at an altitude of 1800 m. The goal of the construction was to regulate the seasonal flow of the Kasakh River and to expand the irrigated lands. In the case of normal backwater level (NBL) of 1835.0 m, the volume is about 91.0 mln m³, the mirror surface is 7.35 km², the average depth is about 12.3 m and the maximum depth is 45.0 m. The level of dead volume is 1810.0 m, corresponding to 6.48 mln m³ volume. The reservoir’s catchment area is 656 km², the average balanced height is 2280 m.

The Marmarik reservoir is located in the Hrazdan river basin, in the Marmarik river bed, at 25 km from the city of Hrazdan. The Marmarik reservoir was built in November 1974, however, after launching in 1975 the lower slope of the dam collapsed without even filling full volume of water, and about 500 thousand m³ soil slipped to the lower pool. The reservoir dam was restored in 2011 with a new height...
of 55.5 m. After the rehabilitation of the dam in 2014, the dam enables regulating the Marmarik river flow, minimizing the possible flood risks during spring floods.

There are no large natural lakes in the Hrazdan's RBD. As one of the major natural lakes, Lake Kari (in the Kasakh River Basin) and Lake Akna (in the Hrazdan River Basin) could be noted. From the origin point of view, the lakes of the Hrazdan river basin are mainly of volcanic origin, and the lakes of Kasakh river basin are of glacial origin. The total area of the lakes are 3.6 km² and 6 km², and the mirror area of the lakes are 30 ha and 80 ha, accordingly.

Groundwater in the Hrazdan RBD, depending on the hypsometric levels, is characterized by variable and constant regimes, with a discharge rate of 1 to 2000 L/s and up to 2g/l water mineralization. Water-bearing layers are located in the intramontane depressions. Groundwater and pressurized aquifers exist in Ararat artesian basin at up to 500m depth. The wells of pressurized aquifers are fountaining at certain sites with a discharge rate of 5 to 100 L/s. Groundwater resources mostly used for drinking purposes, as well as for irrigation and fish breeding purposes in the Ararat valley part of the RBD. Due to dissected mountainous relief, the region is also rich in mineral water springs. Mineral springs are mostly used as table water.

The Hrazdan RBD is characterized by its own unique nature. There are several types of protected areas are located in the RBD: five natural state sanctuaries ("Arzakan-Meghradzor", "Aragatsi Alpyan", "Bankhsi Sochu", "Vordan Karmir", "Hankhavan Jrabanakan"), 1 state reserve ("Erebuni"), 1 state forest (Jrvezh), and 45 natural monuments. 21 of total natural monuments are geological, 9 hydrogeological, 6 hydrographic, 5 natural-historic and 4 biological monuments.

The Arzakan-Meghradzor Reserve was established in 1971-1972 (Decree N212 of 9 April 1971 of the USSR Council of Ministers) for the protection of rare forest animals (brown bear, Caucasian heath-hen). The Reserve is located in the Marmarik and Dalar watersheds at 1600-2100 meters a.s.l. The total area of the reserve is 13 532 ha. The "Aragatsi Alpyan" and "Bankhsi Sochu" reserves were established in 1959 (Decree N20 of 29 January 1959 of the USSR Council of Ministers) with a total area of 300 and 4 ha, accordingly. The "Aragatsi Alpyan" reserve is located in the southern slope of Mount Aragats, surroundings of the Khari natural lake, at 3200-3350 m a.s.l. The object of protection are glacial lakes and surrounding alpine meadows. The "Bankhsi Sochu" reserve is located in the Marmarik river basin, Tsaghkunyats mountain range, at 1800-2000 meters a.s.l. The object of protection is a unique nursery grove of pine trees.

There is considerable tourism potential in the Hrazdan RBD. It is a rich, picturesque and healthy nature region, with forests, mountains, historical and cultural values, natural monuments, medicinal and mineral water springs and infrastructures. In the Hrazdan River Basin, the resort zones of Tsaghkadzor, Hankavan, Aghveran and Bjni are famous tourist centers. There are information centers for tourism development that can help rural tourism development in the region. More than fifty hotels and rest houses are registered in the Hrazdan RBD.

1.1.2 Driving forces on water resources

Hrazdan RBD is the most densely populated river basin district of the Republic of Armenia. It includes Yerevan, the capital of Armenia, with its over 1 million inhabitants. According to the 2011 census data of the National Statistical Service, the total population of the RBD is 1,604,000 (543.9 thousand people without Yerevan City), 52.9% being women, and 47.1% men. The water basin has 190 rural and 13 urban communities. The urban population is 80.5% of the total population (42.5% without Yerevan). The average density of population in the water basin in 2011 was 397 people/km². Population growth in the Hrazdan RBD over the recent years (2007-2017) was observed mainly in Yerevan at 0.4%, and the number of population in other communities increased slightly or did not change.
Based on the NSS annual reports and expert assessment, as of January 2018, the current population in the Hrazdan RBD is 1,646,082. In 2016, the nature of migration of the members aged 15 and more in the households involved in external and internal migration in 2013-2016 was inside the Republic, among Yerevan (5.2%) and marzes, with the Nagorno-Karabakh Republic inter-state migration was dominating. Number of population, having left the country but not returned, was about 19,248. In addition, seasonal population changes have been observed. During the touristic season the population was raised in the several region in the RBD, such as Tsakhadzor, Yerevan, Hankhavan, Byurakan, Aghavnadzor, etc..

The Hrazdan RBD differs from other RA river basins by its level of development and diversified economy. According to the data of NSS RA for 2015-2016, the highest specific weights among the main sectors of economy is that of industry at 10.3% and agriculture at 6.1%.

Based on the Finer Resolution Observation and Monitoring satilied image data provided by the Global land cover system, the total area of the RBD is 396,994 ha. The detailed distribution of the land types is provided in Figure 2.

According to annual data published by the RA NSS and the RA Ministry of Agriculture, as of 2018 the agricultural lands in the RBD covered about 178 900.75 ha, of which 24.4% were arable lands, 32.5% were croplands, 8.6% were irrigated lands, 14.5% were pastures, 0.8% were gardens and remaining 19.1% of agricultural lands used for other purposes (croft lands) or not cultivated.

The main branches of agricultural specialization in the RBD are cultivation of cereals, potato, melons and gourds, as well as viticulture. Livestock breeding (dairy cattle breeding and sheep breeding) is developed in the RBD in particular in the Kasakh river basin, and fish breeding in Hrazdan river basin.

The main obstacle to the development of agriculture in the Hrazdan RBD is water. The agricultural lands in the RBD are serviced by “Aragatsotn”, “Kotayk”, “Yerevan”, “Etchmiadzin” water user associations (WUAs) and “Jrar” CJSC. The total area of irrigation makes about 15,380 ha but as of 2017 only 13,246 ha were irrigated, of which 7,348.7 ha in the Hrazdan River basin and 5,887.3 ha in Kasakh River basin.

Due to the poor condition of the irrigation infrastructure, water loss level is high in the RBD, about more than 50%. About 2134 ha of irrigated agricultural lands are not cultivated mainly due to lack of irrigation water, lack of tertiary networks, high and unaffordable costs for farmers, as well as migration tendency of population for working abroad.

Fish breeding in the Hrazdan RBD is mainly developed in the Hrazdan River basin. It has been one of the fastest growing sectors in Armenia over the past five years. According to the data of the Fisheries Survey for the efficient use of groundwater resources in the Ararat Valley conducted within the USAID ASPIRED Program in 2016, the actual volume of abstracted water from the Ararat Valley (Hrazdan and Araratyans RBDs) groundwater resources is 1,608.54 mln m³, which is about 608 mln m³/year or 60% exceeding the permitted volume in the last 10 years.

In the Hrazdan RBD the industry specializes in food production (meat and meat processing and canning, processing and preserving of fruits and vegetables, dairy products, beverage production, grape processing and wine raw materials) and construction materials mining. The processing industry and production and distribution of electricity, gas and water occupy leading positions in the industrial production of Yerevan - 79.6% and 17.7% respectively.

The Hrazdan RBD is one of the considerably rich regions of the Republic and has great power producing potential. Due to the use of the power potential of Hrazdan and Marmarik Rivers there are three main
HPPs (Hrazdan, Argel, Arzni which are part of the Sevan-Hrazdan HPPs cascade) and 16 small HPPs in the region (annually about 48.3 mln.kWh electricity is produced). Another small HPP is in the stage of construction, and in case it is operated, power production will increase by about 2.4 mln.kWh. Sevan-Hrazdan HPPs cascade is located in the RBD. The complex consists of seven HPPs with 560 MW total installed capacity and 2.32 billion kWh of annual design production. The annual water intake from the Hrazdan River for the operation of Sevan-Hrazdan HPP complex is 1357.04 mln m³/year.

During the USSR years power production in the Hrazdan RBD was implemented also based on heat treatment. Hrazdan TPP was constructed during 1963-1974 at the northeastern section of Hrazdan town. Until 2005 Hrazdan TPP was producing 143 billion kW/h power and 1.23 mln Gcal. thermal energy. Since 2017, the ownership of the Hrazdan TPP is “Liorman Holdings” Ltd., as well as the operation of the 5th power block is provided to the “Gazprom Armenia” Ltd (Hrazdan Energy Company). According to the annual report of the RA Public Services Regulatory Commission, in 2017 the Hrazdan TPP without the 5th power block produced 316.9 mln kW/h power and distributed 295.4 mln kW/h power, as well as the 5th power block produced 992.6 mln kW/h power and distributed 954.5 mln kW/h power.

The territory of the Hrazdan RBD also differs in terms of distribution of minerals. There are more than 60 mines of gold, aluminum, copper-molybdenum, iron, perlite, marble, granite, lithoidal pumice, nephelinite syenites, andesite-basalts, volcanic slag, rock salt and various construction materials. There are five well-stocked mines in the RBD: Hankavan copper-molybdenum deposit, Meghradzor gold and silver mine, Meghradzor gold, silver mine “Lusajur” site, Hrazdan iron mine and Tukhmanuk gold-polymetallic deposit. The 32 mines in the RBD are exploited by 28 entrepreneurs, and 4 others, currently, does not operated due to political or economic reasons (Hankavan copper-molybdenum mine exploited by “Golden Ore” Ltd, Meghradzor gold mine exploited by “Meghradzor Gold” LLC, Lusadjur site of the Meghradzor gold mine exploited by “Paramount Gold Mining” CJSC and Tukhmanuk gold-polymetallic mine exploited by “Mego Gold” LLC).

1.1.3 The Hrazdan RBD in the future.

Construction of new reservoirs is planned to increase water resource storage in the Hrazdan RBD for using the irrigation purposes. The 2017-2025 strategic program envisages the investigation and construction of 2 new artificial reservoirs in Kasakh River basin of Aragatsotn Marz.

In 2017, the RA Parliament approved the amendment on Article 25.1 in Water Code, in accordance with the RA Government encourage the secondary or re-use of water resources. The water resources can be secondary used only for the purposes of agricultural or industrial production. These legislative changes should help to establish new water-saving technologies or other innovative irrigation systems and improve water use in the fish-farming sector. The example of above-mentioned in the Hrazdan RBD is Hayanist and Sayat-Nova communities, where pilot projects to improve irrigation services and to practice an unconventional method of irrigation by reusing the water from a nearby fishery to meet the community's irrigation needs are implemented.

The effective use of water resources is a priority for irrigation water regulation. Currently, irrigation systems efficiency and modernization projects are implemented at the expense of available loan resources. The Ministry of Agriculture developed a project, approved by the RA Government in December 2017, subsidizing interest rate of loans for the introduction of drip irrigation systems and to make the interest rate of such loans less than 2%. The project envisages stimulating the introduction of effective irrigation methods in perennial plants -fruit and vineyards, high-value crops fields.

In 2015 “Yerevan water supply and wastewater project” on the rehabilitation of “Aeratsia” WWTP was launched, funded through credit funds of French Government. It is planned also to connect Sevan town sewage collector to the “Aeratsia” WWTP and to direct the wastewaters to the WWTP for treatment. Currently the “Aeratsia” WWTP modernization and improvement works are underway under Lot-2 of the project.
Within the frameworks of «Armenia Water Investment Programme-Feasibility Study» (cooperation with CECT Infrastructure Consultancy Ltd, financed by EBRD) project started in 2015, the construction of Masis, Kaghshi and Tsaghkadzor WWTPs is also planned.

An extensive on-site assessment of existing laboratory and monitoring system infrastructure and capacities was conducted in the Republic of Armenia with the support of EUWI+ Project experts in close cooperation with the countries’ administrations and experts from the concerned institutions. The goals of the assessment were summarise the current state of knowledge on the existing water monitoring and quality management systems, as well as the needs for technical equipment of the laboratories and trainings for staff. The study referred to the rehabilitation and/or procurement and installation of monitoring and laboratory equipment in order to upgrade the monitoring and laboratory system and to align it with WFD requirements. In the framework of the EUWI+ Project is planned to organize trainings and further technical support for water monitoring laboratory accreditation.

Within the framework of the EUWI+ Project, the detailed assessment of modern flow, measurement equipment needs for irrigation water accounting in the Sevan and Hrazdan river basins were conducted. The inventory of the irrigation canals in the Sevan and Hrazdan RBDs were carried out, which will contribute significantly to development of RBMP and promoting data exchange and sharing between the key water institutions in the country.

1.2 Pressures and impacts of human activities

1.2.1 Water abstraction

**Source of data:** The assessment has been done based on official data on water abstraction mentioned in water use permits provided by the Water resources management agency of the Ministry of Natural Protection of the RA. The data was also compared with data provided by the RA National Statistical Service, the RA Ministries of Agriculture, Emergency Situation, Ministry of Energy Infrastructures and Natural Resources, including the Water Committee (that also provided data from WUAs and Veolia Djur). There was a discrepancy in data received from various government agencies, as well as data gaps and uncertainties were acquired.

The main water users are irrigation and hydropower sectors, as well as fish-farming downstream of the Hrazdan river basin. According to the data of the RA MNP WRMA, as of January 2018, total permitted water abstraction in Hrazdan RBD was 3382.38 mln m³, 1422.03 mln. m³ of which were granted for double water use for hydropower generation through irrigation and drinking canals. Totally 1960.35 mln.m³ were abstracted from water resources in the Hrazdan RBD. The major part of the abstraction was that of surface water - 1177.26 mln m³, and the groundwater abstraction was 783.09 mln m³ (Figure 3).

In the Hrazdan RBD the major part of total water abstraction is implemented for **irrigation purposes.** As of 2018, the water abstraction for irrigation purpose set in water use permits (93 WUPs) is 866.36 mln m³, 42.57 mln m³ of which in the Kasakh river basin and 823.79 mln m³ in Hrazdan river basin. 92.3% of total irrigation water abstraction was accounted for "Jrar" CJSC - 799.74 mln m³, which supplies bulk irrigation water to WUAs. Based on "Assessment of the needs of modern irrigation water meters in Sevan and Hrazdan basins" of the RA MES Arm Hydromet Service, in 2017, the actual irrigation water use, implemented by "Jrar" CJSC and transferred to different WUAs, was 770.0 mln m³.
Based on the WUPs data, in 2017, 512.34 mln m³ of abstracted water was granted as water left out of Lake Sevan.

Hydropower generation uses 16% of total water abstraction in the Hrazdan RBD (double water abstraction from irrigation and drinking canals did not calculated). According to the Water cadaster data of the RA MNP WRMA, as of 2018, in the RBD 28 water use permits were issued for hydropower generation purpose, 17 WUPs of which have given in the Hrazdan river basin and 11 WUPs in the Kasakh river basin. Total water use for hydropower generation, including the water from irrigation and drinking water canals, as well as water left out of Lake Sevan, is 1,736.08 mln m³.

The main water user of *hydropower generation* is the Sevan-Hrazdan HPPs cascade. The operation of the Sevan-Hrazdan cascade largely depends on the water volume left out of Lake Sevan. Therefore, only 5 out of 7 HPPs are operating throughout the year, while other 2 HPPs are operating in the irrigation period, when there are additional water resources in the system. Based on the expert judgment, as of 2018, the Sevan-Hrazdan HPPs annually used about 1,356.99 mln m³ water.

Two other HPPs in the Hrazdan RBD are also located on the irrigation canals, Karbi and Kosh branches of the Arzni-Shamiram. It is important to take into consideration that the water amount in the cascade is subject to double use and ultimately it is fully used for irrigation purposes (calculated in the irrigation water use section).

Besides the Sevan-Hrazdan cascade, in the Hrazdan river basin 7 WUPs were granted to operate the HPP-1 on "Aparan-Yerevan" drinking water canal, the “Avan” HPP on "Katnaghbyur-Yerevan" drinking water canal and 3 HPPs on "Aparan-Yerevan" drinking water canal. These HPPs operation depend on water volume abstracted and used for drinking purposes.

In the Hrazdan RBD 19% of total water abstraction was implemented for *drinking-household purposes*. As of 2018, in Hrazdan RBD for drinking-household purposes total 59 WUPs were granted, 38 of which in the Hrazdan river basin, and 21 WUP in the Kasakh river basin. The total water abstraction for drinking-household purposes, provided under the WUPs for 2017, was 379.61 mln m³.

The major part of the water intake for drinking-household purpose is that of “Veolia Djur” CJSC. “Veolia Djur” CJSC supplies drinking water 137 of total 204 communities in the Hrazdan RBD. Other 67 communities, which are spread all over the RBD, organized the drinking water supply by themselves. However, only 23 communities had WUP, another community level drinking water use did not count in the water cadaster of the RA MNP WRMA. In 2017, total drinking water abstraction by “Veolia Djur” CJSC for 137 communities was 350.498 mln m³, about 74% of which was water loses. Based on the annual report of "Veolia Djur" CJSC, in 2017 the total volume of supplied water was 91.677 mln m³, and the amount of discharged wastewater was 82.973 mln m³.

According to the Water Cadastre data of the RA MNP WRMA, as of 2018, 44 water use permits were granted for *fish breeding purposes*, with an annual total water abstraction of 381.25 mln m³, 92.9% of which was abstracted from groundwater and only 7.1% was abstracted from surface water. Water abstraction points for fish-breeding purposes are mainly located in the lower streams of the Hrazdan River- Masis region of Ararat Marze of RA (Ararat Valley). There are 10 large fish farms, which implemented 79.57% of total water abstraction for fish breeding.
Water use for **industrial purpose** in the Hrazdan RBD is mainly carried out in food industry, light industry and mining industry. As of 2018, in the Hrazdan RBD the water abstraction for industrial purposes set in the WUPs is 19.08 mln m³, 99.7% of which was given in the Hrazdan river basin (mainly in Yerevan City).

According to the Water Cadaster data of the RA MNP WRMA, as of January 2018, totally 50 water use permits were granted for industrial purposes. Relatively large water users in the Hrazdan RBD is “Hrazdan-Cement” Ltd and Hrazdan Energy company for the operation of the Hrazdan TTP, which were granted 5.17 mln m³ and 8.84 mln m³ of WUP, accordingly. Other industrial enterprises abstract water at the volume less than 0.6 mln m³ of water.

### 1.2.2 Main pollutions

Waters of the rivers in the Hrazdan RBD are polluted by the return flows from agriculture, including fish farming, residential areas both point and diffuse sources of pollution, as well as surface runoff from the abandoned mines and tailings dams.
The main point source of pollution in the Hrazdan RBD is wastewater discharge. According to the RA MNP WRMA Water Cadaster data, as well as expert assessment results, as of January 2018, the amount of wastewater discharged was 1,301.8 mln m$^3$ annually (domestic and industrial wastewater), 201.12 mln m$^3$ was domestic wastewaters discharged into the nearby river (Hrazdan or Kasakh rivers) through sewage systems. The sewer wastewater was only 123.38 mln m$^3$. 90-95% of industrial and domestic wastewater was not collected and treated. Domestic and industrial wastewaters of urban settlements in the Hrazdan RBD directly flow into surface water and also infiltrated into the groundwater resources, since wastewater treatment plants do not operate properly. In addition, sewerage pipelines are worn out and most of them need repair or major renovation. The hydrochemical monitoring and assessment results showed that among the point sources, domestic wastewater makes significant pressure on the quality of the Hrazdan and Kasakh rivers’ water resources, and is subject to investigations if it puts water bodies at risk to fail the WFD environmental objectives.

Wastewater from food and non-food industry in the Hrazdan RBD is mainly discharged into sewage collector, and the impact it has is added to that of household wastewater. In the RBD industrial enterprises are mostly accumulated in large cities, especially in Yerevan (more than 90%), and the production process wastewaters are discharged into sewers. According to data from RA MNP WRMA, total amount of industrial wastewater, mainly from food industry, discharge in the RBD is about 1,1100.68 mln m$^3$, of which 17.5 mln m$^3$ is directed into municipal sewers and then discharged into adjacent rivers (mainly into the Hrazdan and Kasakh rivers). Based on hydrochemical monitoring and expert assessment results, the wastewater discharge from food industry has significant impact on water quality in the Hrazdan RBD.

Diffuse sources of pollution of waters in the Hrazdan RBD are livestock breeding, overgrazing and the abandoned mines and tailing dams. Based on the expert assessment, due to the high level of the livestock breeding, especially in the Kasakh river basin, nitrogen and phosphorus discharges in water resources are quite high. Expert analysis shows that high concentrations of these pollutants are observed in the mid and low streams of the Hrazdan River, as well as in the Kasakh River, in the Aparan region.

The water pollution from non-point sources of the mining observed in Halvar river of the Kasakh river basin. In the period of spring freshets and summer floods, as a result of snow melting and heavy rainfall, a large amount of ore is washed and discharged from the Tukhmanuk open mine and non-reclamated tailing dam into the Halavar river, painting it grayish red color and pollutants the river waters with heavy metals.

**Water quality.** Water quality monitoring of surface water and groundwater resources in the Hrazdan RBD is conducted by the EMIC SNCO under the RA MNP in 22 sampling points for surface water and 8 for groundwater. Water quality monitoring is carried out every month for surface water and twice a year for groundwater.

According to the monitoring data for 2015-2017, the quality of surface waters in the rivers of the Hrazdan RBD are of hydrocarbonate-sodium-potassium nature, with moderate mineralization, characterized by weak alkaline water environment and low hardness. Content of suspended solids in the rivers varies based on seasonality. According to the monitoring data and water quality norms set by the RA Gov. Decree №75-N, 2011, the oxygen regime in the rivers of the Southern BMA is satisfactory and corresponds to “Excellent” or “Good” water quality classes along the entire length of the rivers for sustaining of aquatic ecosystems, except the Hrazdan and Getar Rivers, where critical lack of oxygen was observed. High values of BODs and COD indicate the high levels of organic pollutants in the waters.
of the Hrazdan, downstream of Yerevan City. According to monitoring data, concentrations of nutrients, such as ammonium and phosphates ions, are high along the middle and lower reaches of Hrazdan, Tsakhadzor and Kasakh rivers due to domestic wastewater discharge into the rivers' water. Based on the water quality monitoring data in 2015-2017, concentrations of these nutrients increased in about 40-50 times (in a case of ammonium ion – up to 300 times) during the whole year at the sampling points downstream the city of Yerevan of Hrazdan river, downstream the town of Tsakhadzor of Tsakhadzor river and downstream the towns of Aparan and Ashtarak of Kasakh river. It results in eutrophication processes in the lower reaches of the main rivers in the RBD, which cause a degradation of the ecosystem.

According to the monitoring data for 2015-2017, groundwater resources in the Hrazdan RBD are mostly characterised by moderate mineralization (up to 1 g/l total dissolved solids (TDS)) and total hardness (about 1-7 mmol/l) with 8-14 °C water temperature. The groundwaters are of high quality and are used to provide large settlements with drinking water. Akunk-Katnaghbyur, Arzakan, Arzni, Gymush springs and other large drinking water sources are in the Hrazdan RBD. Aparan, Muqli-Kuchak, Shor-Shor, Bazmaghbyur and other springs are the Kasakh River basin underground water sources. All the above mentioned springs are of high quality with mineralization of up to 0.5 g/l TDS, temperature of 8-10 °C, pH of 7-7.3, hardness of 2-3 mmol/l.

1.3 Water bodies status & delineation

In the Hrazdan RBMP the “Water body” definition was used according to provisions of EU WFD article 2.3.1 and EU WFD Common Implementation Strategy (CIS) guidance document N2. According to the EU WFD, a surface water body means a discrete and significant element of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, transitional water or a stretch of coastal water which differ from each other by specific natural characteristics, the nature of human pressure and other essential parameters. A groundwater body represents a distinct body of groundwater flow with a coherent flow unit including recharge and discharge areas with little flow across the boundaries. The main objectives of water body delineation are the indication of the water bodies at risk and elaboration of necessary measures for the improvement of their chemical and ecological status to good status.

Based on the criteria for the delineation of surface water bodies 110 surface water bodies were delineated in the Hrazdan RBD, including:

- 69 natural surface water bodies, among these 23 at risk;
- 8 - heavily modified water bodies;
- 35 - artificial water bodies.

1 For full compliance with the WFD minor changes regarding the delineation may still occur
The water bodies at risk of the rivers, where anthropogenic pressure has been assessed as significant, are listed in the following table.

<table>
<thead>
<tr>
<th>River Name</th>
<th>Number of WBR</th>
<th>Location of Water bodies at risk</th>
<th>Characterization of Water bodies at risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meghradzor</td>
<td>WBR-01</td>
<td>Meghradzor river from intake of its Tazh tributary to the river mouth.</td>
<td>Diffuse pollution from mining- surface water flows formed in Meghradzor Gold open mine.</td>
</tr>
<tr>
<td>Marmarik</td>
<td>WBR-02</td>
<td>Marmarik river from Meghradzor village to the Aghavanadzor village.</td>
<td>Diffuse pollution from mining- surface flows formed on Meghradzor Gold open mine.</td>
</tr>
<tr>
<td>Tsakhadzor</td>
<td>WBR-03</td>
<td>Tsaghkadzor River from Tsaghkadzor City to the river mouth.</td>
<td>Untreated domestic household wastewater of Tsaghkadzor town.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-04</td>
<td>Hrazdan river from Akhpara reservoir to intake of the River Dalar.</td>
<td>Violation of ecological flow given by expert conclusion, as well as the untreated wastewater of Hrazdan city and adjacent settlements.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-05</td>
<td>Hrazdan River from Dalar to Gyumush HPP.</td>
<td>Violation of ecological flow, untreated wastewater of the City of Charentsavan and adjacent settlements, as well as return flows from agriculture.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-06</td>
<td>Hrazdan River near from Nurnus to Arzni settlement.</td>
<td>Over water abstraction, as well as untreated domestic-household wastewater and return flows from agriculture.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-07</td>
<td>The Hrazdan River from Arzni to the Kanaker HPP.</td>
<td>Wastewater from water and adjacent settlements. Wastewater of Hrazdan gorge recreation zones and restaurant complexes.</td>
</tr>
<tr>
<td>Akhunkh</td>
<td>WBR-08</td>
<td>Akunq river from Mayakovski settlement to the river mouth.</td>
<td>Untreated wastewater of the City of Abovyan and adjacent settlements, as well as return flows from agriculture.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-09</td>
<td>Hrazdan River from Kanaker HPP to Artashat Canal.</td>
<td>Changes in hydromorphological state, as well as untreated wastewater from the City of Yerevan and recreation zones, restaurants at Hrazdan Gorge.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-10</td>
<td>Hrazdan River from Artashat Canal to the reservoir of “Lake Yerevan”.</td>
<td>Changes in hydromorphological state, as well as untreated wastewater from the City of Yerevan and recreation zones, restaurants at Hrazdan Gorge.</td>
</tr>
<tr>
<td>Getar</td>
<td>WBR-11</td>
<td>Getar River, the right-wing tributary of the River Jrvezh.</td>
<td>Changes in hydromorphological state, as well as untreated wastewater from the City of Yerevan and restaurants.</td>
</tr>
<tr>
<td>Jrvez</td>
<td>WBR-12</td>
<td>Jrvezh river, the left-wing of the tributary of the River Hrazdan.</td>
<td>Changes in hydromorphological state and ecological flow, as well as untreated wastewater of the City of Yerevan.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-13</td>
<td>Hrazdan River from Yerevan Lake to Sayat-Nova settlement.</td>
<td>Existence of heavily modified water body, as well as untreated wastewater of adjacent settlements.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-14</td>
<td>Hrazdan River from Sayat-Nova settlement to Mkhchyan’s water junction canal.</td>
<td>Violation of the ecological flow, as well as untreated wastewater of adjacent settlements.</td>
</tr>
<tr>
<td>Hrazdan</td>
<td>WBR-15</td>
<td>Hrazdan River from the Mkhchyan water junction canal to the discharge into Araks river.</td>
<td>Over water abstraction, as well as untreated wastewater from adjacent settlements, as well as return flows from agriculture.</td>
</tr>
<tr>
<td>Halvar</td>
<td>WBR-16</td>
<td>Halvar River from the Tukhmanuk gold mine to the below of the village of Meliq.</td>
<td>Diffuse pollution from mining -surface water flow formed at the the Tukhmanuk Gold Open Mine.</td>
</tr>
<tr>
<td>Kasakh</td>
<td>WBR-17</td>
<td>Kasakh river from Aparan town to Aparan reservoir.</td>
<td>Untreated wastewater of Aparan town, as well as return flows from agriculture.</td>
</tr>
<tr>
<td>Gegharot</td>
<td>WBR-18</td>
<td>Gegharot River from the height of 3000 meters to the abstraction point.</td>
<td>Natural pollution, due to geological and geochemical peculiarities of the footprint of Mount Aragats (there are sources of acid water).</td>
</tr>
<tr>
<td>Gegharot</td>
<td>WBR-19</td>
<td>Gegharot River from the Aragats settlement to the river mouth.</td>
<td>Violation of the ecological flow, over abstraction, as well as natural pollution (there are sources of acid water).</td>
</tr>
<tr>
<td>Kasakh</td>
<td>WBR-20</td>
<td>Kasakh River from Ohanavan settlement to the end of the Ashtarak town.</td>
<td>Violation of the ecological flow, as well as untreated wastewater of the Ashtarak town, recreation zones and restaurants.</td>
</tr>
<tr>
<td>Kasakh</td>
<td>WBR-21</td>
<td>Kasakh River from the end of Ashtarak town to intake of Amberd Tributary.</td>
<td>Untreated wastewater of Ashtarak town.</td>
</tr>
<tr>
<td>Amberd</td>
<td>WBR-22</td>
<td>Amberd River from the town of Byurakan to the river mouth.</td>
<td>Untreated wastewater of Byurakan town, resort houses and camps.</td>
</tr>
</tbody>
</table>
The groundwater bodies (GWBs) were identified by the following specifications: lithological composition, water movement, formation and accumulation environment (porous, fracture, fractured porous), source of feeding, location depth, nature of pressure, total discharge, chemical composition of water, actual water abstraction, associated water ecosystems, existing pressures.

12 GWBs has been identified within hydrogeological complexes of the Hrazdan RBD (Figure 4). GWBs were delineated based on the conditions of their formation, accumulation, discharge and use. GWBs are characterized by natural weak protection and direct contact with atmospheric phenomena (precipitation, temperature) and anthropogenic factors. By their quantitative and chemical statuses, the delineated GWBs correspond to Good groundwater quality class. All groundwater bodies are used for drinking/household, agricultural and industrial purposes.

In the tectonic fault zones of studied RBDs the Hankavan, Bjni and Arzni mineral groundwater bodies (MGWBs) are identified, which are used for recreation, bottling and carbon dioxide obtaining.

**Monitoring system.** Water monitoring of surface water resources in the Hrazdan RBD is carried out in 13 hydrological and 22 hydrochemical observation points. Surface water quality and quantity monitoring is carried out 11-12 times annually, one time each month. The oxygen, mineralization and nutritional regime are analysed, as well as 42-68 hydrochemical, including heavy metals, primary and secondary organic pollutants.
Based on the water quality monitoring data for 2015-2017 of 22 observation points, the water bodies status were assessed by surface water quality standards set by Government of the Republic of Armenia Resolution № 75-N. According to the classification results, the 22.7% of the sampling sites corresponded to the Good water quality status, 31.8% to Moderate, 13.6% to Poor and 31.8% to Bad water quality status.

The groundwater monitoring is obtained in the 22 observation points, 8 of which are considered also as a water quality monitoring sampling points. Groundwater quality and quantity monitoring is carried out twice a year, in May and November. In 8 observation points the water quality monitoring is carried out to perform full chemical analysis. The oxygen, mineralization and nutritional regime are analysed (up to 20 parameters). The water quality norms and criteria for assessing the groundwater chemical quality do not establish in the Republic of Armenia.

The current water quality and quantity monitoring networks do not fully met to the EU WFD requirements. The networks are designed in 1991 based on Soviet Union requirements and the do not cover all water resources in the country, as well as water quality and quantity sampling points do not match, biomonitoring of surface water and monitoring of wetlands is not implemented. In addition, the current water monitoring networks in the Hrazdan RBD is described with insufficient quantity of monitoring sites. In the area occupying about 2565 km², 22 observation points for surface and 22 observation points for groundwater cannot be considered as sufficient for the monitoring of water resources in whole RBD. The density of the monitoring network in the Hrazdan RBD with complicated climatic and hydrogeological conditions is 1 point per 203 km².

Monitoring networks of the quality and quantity of surface and groundwater, as well as the frequency of observations and a list of parameters should be revised in accordance with the rules and regulations of the EU WFD.

1.4 Governance

In Armenia water sector reforms started more than 15 years ago with relevant legal and institutional settings. The recent achievements of the country, related to the implementation of IWRM, is the adaptation of the three Basin management plans (Araratyan, Southern and Akhuryan), and actions are taken toward the development of the other two plans (Hrazdan and Sevan).

During 2016-2017 the Ararat, South and Akhuryan basin management plans were elaborated and approved by the Government of Armenia. During the development and implementation of the plans it was necessary to revise the content of the water basin management model plan in line with the current water management and protection requirements. For that purpose, pursuant to Article 6 of Protocol No. 45 of the RA Government’s session of 26 October 2017, The RA government's protocol decision “On Making Amendments and Addenda to the Protocol Decision Approved by Item 5 of Protocol No. 4 of the RA Government’s session of February 3, 2011” was approved.

It is also noteworthy the new regulations of maintaining Water State Cadaster set by the RA Gov. 02.02.2017 N68-N decision. According new regulations, it is anticipated to develop a GIS-based online platform to enable access of water data and information of public and relevant inter-agencies. The data of the State Water Cadaster, except for information containing official, commercial and other secret protected by law, are placed on a relevant web-site, which can be used free of charge by all interested legal entities and individuals.
One of the main challenges of the IWRM implementation in Armenia is the weak HR and technical capacities of water management institutions. The continuous flow of experts within state water management bodies is observed. Beside lack of the HR capacities, the state water management and monitoring bodies do not have enough technical and financial capacities to conduct the water resources management at national and regional level, as well.

Another important key to implementing IWRM principles is the establishment of the efficient intersectoral cooperation mechanism within the water sector bodies, specifically, in the area of national water cadaster, monitoring data and data collection and sharing for designing the river basin management plans. From this point of view, there are legislative bases for ensuring the exchange of data and information about water in various government bodies on water resources.

The RA legislation also explicitly specifies the mandatory list of documents the public needs to be notified of. This formal process is followed in terms of observance of all mandatory requirements as regards the timeframes for public notification and publishing of information, however, the actual picture shows that public participation is very weak.

In addition to the public and inter-sectoral data sharing, there are big gap and uncorrespondence between data held by different state agencies. The existing water databases in the different state bodies have not been updated and contain a number of uncertainties. There were no data about actual water use and wastewater discharge by sectors. The water use in the Hrazdan RBD can be assessed only based on water abstraction data coming from water use permits database. There is a discrepancy in the data of the RA Ministry of Agriculture and the MEAN Water Committee. The expert judgment has been done in case of the uncertainty in water use/abstraction data.
2 MAIN ISSUES

2.1 Health

- Improve and re-build the drinking water supply and domestic wastewater discharge systems.

Among the communities in the Hrazdan RBD mainly the urban communities receive drinking water from centralized water supply systems, where water disinfection is carried out according to the established order. However, in the rural communities, water supply and wastewater networks are in extremely poor and worn out condition: no disinfection of supplied drinking water, a high level of drinking water leakage, absence or poor conditions of wastewater systems, the septic pits and single pits do not correspond to the sanitation rules and norms. These create serious problems in terms of supplying the population with high quality water corresponding to the standards.

- Establish norms for irrigation water quality and strict control to prevent the use of untreated domestic wastewaters for irrigation.

In some areas of the Harzdan RBD, untreated domestic wastewaters are used for irrigation purposes. Based on the FAO norms for irrigation water quality, the lower reaches of the Hrazdan and Kasakh rivers can be used only for irrigation in a case of frequently irrigated and leached out soils with good drainage capacity, due to high pollution of domestic wastewater discharge.

2.2 Quality

- Build wastewater treatment plants in the communities, in order to prevent the surface and ground waters pollution by domestic wastewater discharge.

Due to the untreated domestic and industrial wastewater discharge into the rivers, concentrations of nutrients and organic compounds gradually increase downstream of Hrazdan, Kasakh, Marmarik and Tsakhadzor rivers. Based on water quality monitoring data for 2015-2017 of the RA MNP EMIC, at lower reaches of the Kasakh River, downstream of Aparan and Ashtarak towns, and at lower reaches of the Tsakhadzor River, downstream Tsakhadzor town, the water quality was decreased up to Moderate (III) and Poor (IV) quality classes by the high concentration of phosphate, ammonium ion and COD. The water quality of the Hrazdan and Getar Rivers, downstream the Yerevan city, corresponds to Bad (V) quality class because of dissolved oxygen, ammonium, nitrite, phosphate, BOD₅, COD, vanadium and manganese.

- Establish the water quality standards for groundwater quality.

The water quality norms and criteria for assessing the groundwater chemical status do not establish in the Republic of Armenia.
- Revise the surface and groundwater quality monitoring current networks in the Hrazdan RBD, as well as the frequency of observations and a list of parameters, in accordance with the rules and regulations of the EU WFD.

Current water quality monitoring system does not describe the water quality chemical status appropriately. 22 surface and 8 groundwater quality monitoring observation points do not include the majority of water resources in the RBD. In addition, concentrations of the pesticides, heavy metals and BTEX (benzene, toluene, ethylbenzene and xylene isomers) are not measured in the groundwater. The biological monitoring and assessment of the surface water are not carried out, as well.

### 2.3 Quantity

- Revise the surface and groundwater quantity monitoring current networks and the frequency of observations in the Hrazdan RBD, in accordance with the rules and regulations of the EU WFD.

Current water monitoring networks in the Hrazdan RBD is described with insufficient quantity of monitoring sites. In the area occupying about 2565 km², 13 observation points for surface and 22 observation points for groundwater quantity monitoring cannot be considered as sufficient for the monitoring of water resources in whole RBD. There are no observation points in the dams of the water reservoirs to observe and control the river flow. As a result, the reservoirs constructed in the river beds in the Hrazdan basin destroying the continuum and natural hydrological regime (river flow characteristics) of the rivers. In addition, the hydromorphological monitoring of the surface water in the RBD does not conducted.

- Improve the institutional capacity of the water use management and control within the Hrazdan RBD in order to protect and ensure efficient use of water resources.
- Establish strict control on preservation of the environmental flow of the river in the RBD.
- Revise current environmental flow calculation methodology in order to make it more practical for users.

The high level of groundwater abstraction for fish-breeding purposes in the Masis region of the Hrazdan RBD, poses significant pressure on the groundwater resources of the Hrazdan RBD. Surface water use for industrial purposes in the Hrazdan and Kasakh river basins poses significant hydromorphological pressure on the rivers, since a significant change in the natural flow regime occurs. Also, the Sevan-Hrazdan hydropower cascade poses significant pressure on the Hrazdan River, in particular, destroying the natural flow regime, the natural regime of flow velocity, water level fluctuations, sediment accumulation and other characteristics.

### 2.4 Ecosystems

Establish biomonitoring and hydromorphological observations of the surface water to assess the ecosystem ecological status.

Assessment of the vulnerability of aquatic ecosystems of the rivers in the RBD was not been possible, because of the biological monitoring and hydromorphological observations are not carried out in the Republic of Armenia.
2.5 Governance

Improve the water legislation and institutional capacity of the RA Government, in order to solve the following main challenges, which were revealed during advancement of the IWRM implementation in the Hrazdan RBD:

- Insufficient enforcement of available legislation;
- Lack of implementation mechanisms for the existing legal acts; are not applied or enforced sufficiently;
- Water sector agencies lack technical and human capacity, are not able to develop basin management plans without external support from donor-funded projects;
- Limited liabilities of BMOs, including lack of power to provide water use permits
- Weak inter-sectoral cooperation mechanisms;
- Low tariff for water use;
- Lack of water quality/quantity normative and methodological basis;
- Lack of mechanisms to ensure enough transparency for water resources management;
- Insufficient budget allocation for implementation of measures prescribed in the basin management plans that have already been adopted by the government;
- Lack of capacity building programs supported by the government.
3 TIMETABLE AND WORK PLAN

RBMP's development in Sevan & Hrazdan basins, Armenia

Jan 2018  Jan 2019  Jan 2020  Jul 2020

1. Time table & work plan
2. Main water issues
3. Environment & monitoring
4. PoM & RBMP
5. Draft RBMP

Pilot basins design
General characterisation
RBMP 1st part
RBMP 2nd part
RBMP

Capacity building
1. Basin public consultation

RBMP steps
4 TECHNICAL REPORTS

Introduction and General Characterization of the Harzdan RBD (the first technical report). In this report the legal and Institutional analyses of the river basin management and the plan implementation were provided. The report included the General characterization of the Hrazdan RBD, in the detailed description of natural conditions (geographic overview, climate, geology, mudflows, landslides, floods, etc.), population, demography, hydrological, including groundwater characteristics, as well as water use and preliminary study of water balance and water-economy balance.

Pressure and Impact analyses (the second technical report). The main drivers, such as agriculture, hydropower, fish farming, water supply and wastewater discharge, industry, tourism, etc. were studied and provided in this report. The report included the analysis of pressure types on water resources in the RBD. Particularly the point and diffuse sources of pollution on surface and ground water resources were assessed. The hydromorphological alterations, as well as information about future infrastructure projects were also provided.

Protected areas and the ecological status of waters (the third technical report). In this report the description, specificities of management, mapping of key protected areas located within the RBD were provided. The detailed analyses of water status of surface and ground waters in the Harzadn RBD, including water bodies at risk were identified.
### 5 GLOSSARY

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water balance</td>
<td>Water balance is a relation of water inflow, outflow and accumulation (change of storage) in any river basins or water bodies in a given period (year, month, decade and other).</td>
</tr>
<tr>
<td>Impacts</td>
<td>The environmental effect of the pressure (e.g. fish killed, ecosystem modified).</td>
</tr>
<tr>
<td>Monitoring</td>
<td>Water monitoring involves the assessment of the quality of the surface or ground water in order to control the risk of pollution. It is used as the basis of the production of water quality and quantity impact assessments.</td>
</tr>
<tr>
<td>Pressures</td>
<td>The direct effect of the driver for example, an effect that causes a change in flow or a change in the water chemistry.</td>
</tr>
<tr>
<td>Significant Pressure</td>
<td>Any pressure that on its own, or in combination with other pressures, may lead to a failure to achieve the specified objective.</td>
</tr>
<tr>
<td>River Basin District</td>
<td>The area of land and sea, made up of one or more neighbouring river basins together with their associated groundwaters and coastal waters.</td>
</tr>
<tr>
<td>RBMP</td>
<td>River Basin management Plan, territorial planning document: it gives the overall orientations of water management in the basin and the objectives to be reached, the delay and the priorities in the actions to be developed for a defined period of time.</td>
</tr>
<tr>
<td>Status</td>
<td>Condition of a water body resulting from natural and anthropogenic factors (= potential).</td>
</tr>
<tr>
<td>Good Status</td>
<td>Slight changes compared to the natural condition: The values of the biological quality elements for the surface water body type show low levels of distortion resulting from human activity, but deviate only slightly from those normally associated with the surface water body type under undisturbed conditions.</td>
</tr>
<tr>
<td>Bad status</td>
<td>Absence of large portions of biological communities normally associated with the surface water type under undisturbed conditions.</td>
</tr>
<tr>
<td>Driver</td>
<td>An anthropogenic activity that may have an environmental effect (e.g. agriculture, industry).</td>
</tr>
<tr>
<td>Ground water body</td>
<td>Represent a distinct body of groundwater flow with a coherent flow unit including recharge and discharge areas with little flow across the boundaries.</td>
</tr>
<tr>
<td>Surface water body</td>
<td>Discrete and significant element of surface water such as a lake, a reservoir, a stream, river or canal, part of a stream, river or canal, transitional water or a stretch of coastal water which differ from each other by specific natural characteristics, the nature of human pressure and other essential parameters.</td>
</tr>
<tr>
<td>Artificial or Heavily Modified water body</td>
<td>HMWB are bodies of water which, as a result of physical alterations by human activity, are substantially changed in character for which the achievement of “good status” would have significant adverse effects on uses. AWB are water bodies created by human activity. Instead of good ecological status (GES), the environmental objective for HMWB and for AWB is good ecological potential (GEP), which has to be achieved by a specific deadline.</td>
</tr>
<tr>
<td>Water body at risk</td>
<td>A water body that is identified as being at risk of failing the environmental quality objectives based upon the characterisation as specified in article 5 of the WFD and results of operational monitoring as specified in article 8 of the WFD.</td>
</tr>
</tbody>
</table>