

European Union Water Initiative Plus for
Eastern Partnership Countries (EUWI+): Results 2 and 3

Result 2 & 3

DRAFT RIVER BASIN MANAGEMENT PLAN
FOR HRAZDAN RIVER BASIN DISTRICT IN ARMENIA
ATLAS



Version 1; September 2020

Full Draft Hrazdan RBMP-2 - ATLAS

Beneficiary

Ministry of Environment of the Republic of Armenia

Responsible EU member state consortium project leader

Alexander Zinke, Environment Agency Austria (UBA, Austria)

EUWI+ country representative in Armenia

Vahagn Tonoyan

Responsible international thematic lead expert

Florence PINTUS (OiEau, International Office for Water, France)

Responsible national thematic lead expert

Edgar Pirumyan, Head of the Department for Licenses, Permits and Compliances, Ministry of Environment
Nazik Jzmachyan, Chief Specialist, Department for Licenses, Permits and Compliances, Ministry of Environment
Andranik Arakelyan, Head of Hrazdan Territorial Water Basin Management Division, Department Ministry of Environment
Stepan Stepanyan, Head of Sevan Territorial Water Basin Management Division, Department Ministry of Environment
Levon Azizyan, Acting Director, Hydrometeorology and Monitoring Centre SNCO, Ministry of Environment
Gayane Shahnazaryan, Deputy Director, Hydrometeorology and Monitoring Centre SNCO, Ministry of Environment
Edgar Misakyan, Head of Hydrology Service, Hydrometeorology and Monitoring Centre SNCO, Ministry of Environment
Harutyun Yeremyan, Head of Groundwater Monitoring Service, Hydrometeorology and Monitoring Centre SNCO, Ministry of Environment
Hovik Aghinyan, Chief Hydrogeologist, Hydrometeorology and Monitoring Centre, Ministry of Environment
Armine Hakobyan, Head of Hydrogeological Research Division, Groundwater Monitoring Service, Hydrometeorology and Monitoring Centre SNCO, Ministry of Environment
Anna Zatikyan, Head of Information analysis service, Hydrometeorology and Monitoring Centre SNCO, Ministry of Environment
Karen Daghbashyan, Deputy Chairman, Water Committee, Ministry of Territorial Administration and Infrastructures

Authors

A.B. Nalbandyan Institute of Chemical Physics of National Academy of Science Republic of Armenia
Minasyan Seyran, Tavadyan Ashot, Martirosyan Levon, Misakyan Edgar, Shahnazaryan Gayane, Zakaryan Davit, Tavadyan Agasi, Hambardzumyan Artur

Disclaimer:

The EU-funded program European Union Water Initiative Plus for Eastern Partnership Countries (EUWI+ 4 EaP) is implemented by the United Nations Economic Commission for Europe, the Organisation for Economic Co-operation and Development, both responsible for the implementation of Result 1, and an EU Member States Consortium comprising the Environment Agency Austria (UBA, Austria), the lead coordinator, and the International Office for Water (OiEau, France), both responsible for the implementation of Results 2 and 3. The programme is co-funded by Austria and France through the Austrian Development Agency and the French Artois-Picardie Water Agency.

This document was produced by the EU member state consortium with the financial assistance of the European Union. The views expressed herein can in no way be taken to reflect the official opinion of the European Union or the Governments of the Eastern Partnership Countries.

This document and any map included herein are without prejudice to the status of, or sovereignty over, any territory, to the delimitation of international frontiers and boundaries, and to the name of any territory, city or area.

Imprint

Owner and Editor: EU Member State Consortium

Umweltbundesamt GmbH	Office International de l'Eau (IOW)
Spittelauer Lände 5	21/23 rue de Madrid
1090 Vienna, Austria	75008 Paris, FRANCE

Responsible IOW Communication officer:

Chloé Déchelette
c.dechelette@oieau.fr

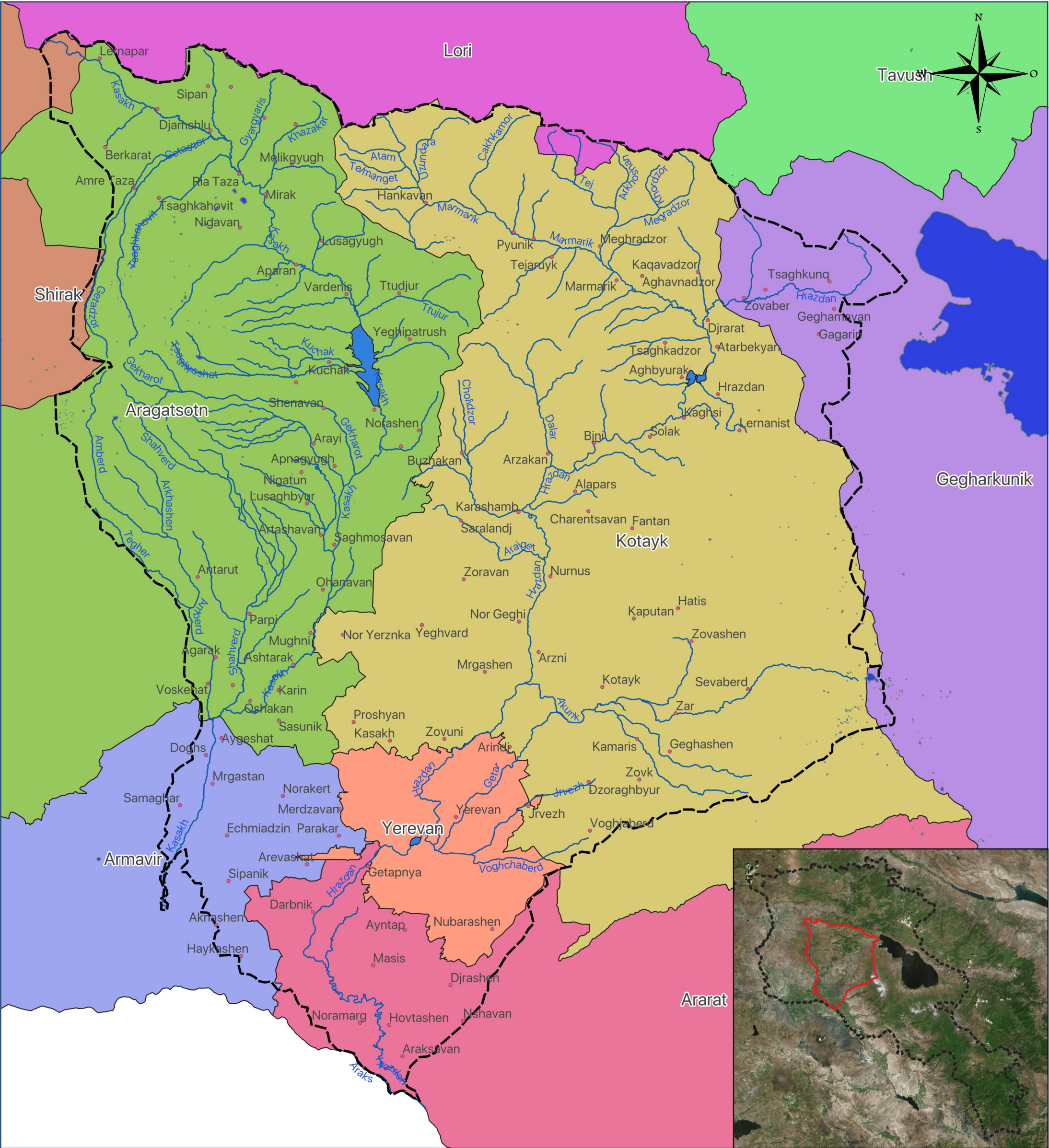
September, 2020

CONTENTS

Map 1 – Administrative	4
Map 2 – Overview	5
Map 3 – Water abstraction	6
Map 4 – Springs	7
Map 5 – Irrigation	8
Map 6 – HPPs	9
Map 7 – Climate	10
Map 8 – Precipitation.....	11
Map 9 – Evaporation.....	12
Map 10 – Land Cover.....	13
Map 11 – Mudflow	14
Map 12 – Population 2011	15
Map 13 - Population change 2011-2017.....	16
Map 14 – Population de jure de facto	17
Map 15 – Surface Natural Flow.....	18
Map 16 – Deep Flow	19
Map 17 – Groundwater bodies	20
Map 18 – Mining	21
Map 19 – Water balance	22
Map 20 – Landslides.....	23
Map 21 – Wastewater	24
Map 22 – Protected Areas.....	25
Map 23 – Water Monitoring Network	26
Map 24 – Irrigation water quality classes.....	27
Map 25 – Water quality	28
Map 26 – Nitrate	29
Map 27 - Delineation	30
Map 28 – Delineation risk.....	31
Map 29 - Environmental Objectives	32
Map 30 – Protected Area 1	33
Map 31 – Protected Area 2.....	34
Map 32 – Protected Area 3.....	35
Map 33 – Agglomeration 1	36
Map 34 – Agglomeration 2	37

Map 35 – Proposed measures	38
Map 36 – Proposed monitoring sites.....	39
Map 37 – Risk assessment GWBs	40
Map 38 – Ecological Status SWBs	41

Map 1. Administrative map of Hrazdan RBD



Background layer legend

- Lakes and reservoirs
- Hrazdan RBD
- Rivers
- Settlements
- Marzes

Data source

RA MNP, Water Resource Management Agency



"European Union Water Initiative plus for Eastern Partnership Countries"

Jinj

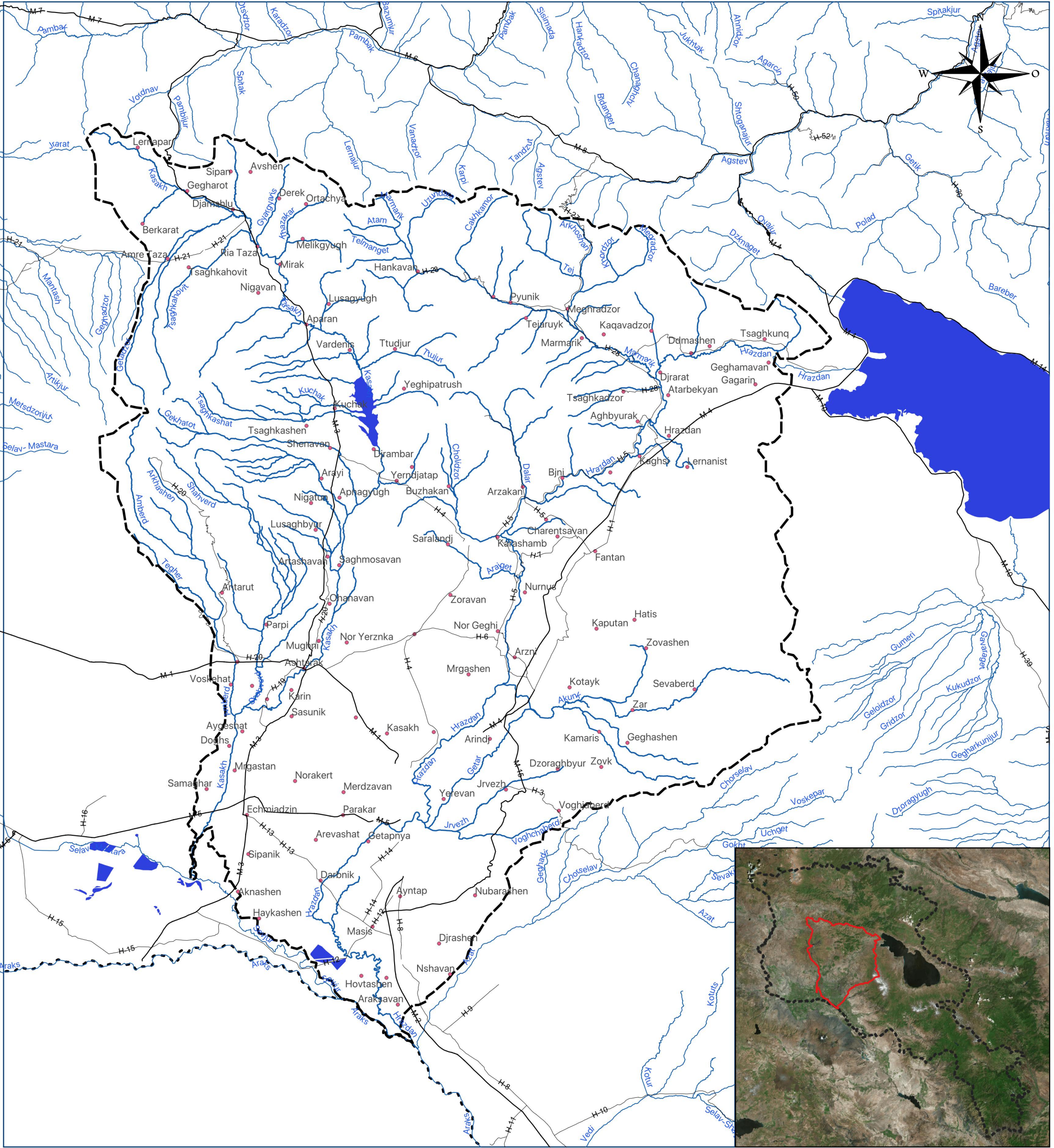
Revision

5 January 2019

WGS 84 / UTM zone 38N

3 0 3 6 9 12 km

Map 2. Overview map of Hrazdan RBD



Background layer legend

- Lakes and reservoirs
- Hrazdan RBD
- Rivers
- Settlements
- State border
- Roads
 - Main roads
 - Secondary roads

Data source

RA MNP, Water Resource Management Agency



"European Union Water Initiative plus for Eastern Partnership Countries"



Jinj

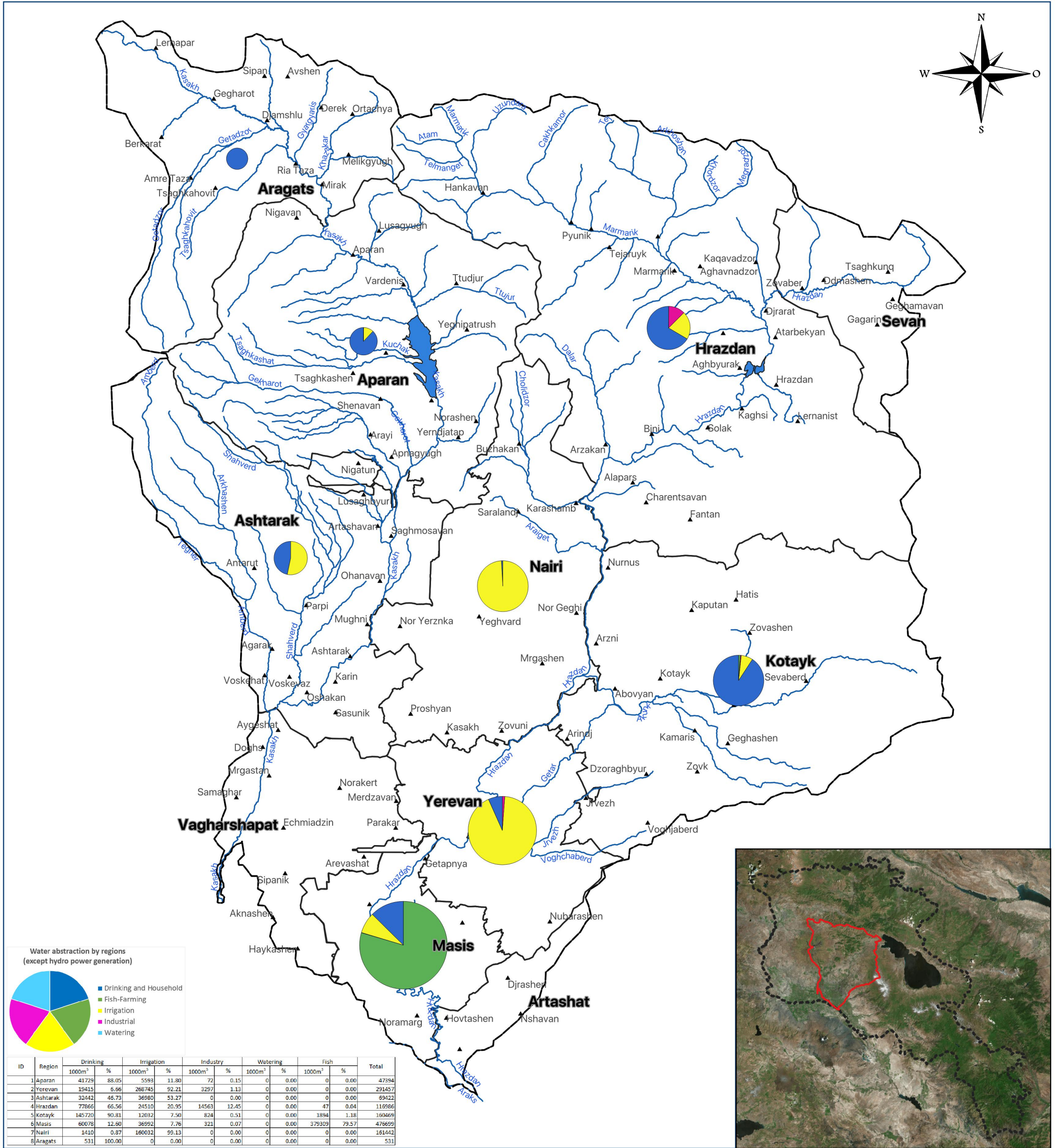
Elaboration

7 February 2019

WGS 84 / UTM zone 38N

3 0 3 6 9 12 km

Map 3. Water abstraction within Hrazdan RBD



Background layer legend

Reservoirs

Hrazdan RBD

Rivers

Settlements

Data source

RA MNP, Water Resource Management Agency

Action funded by the EUROPEAN UNION

"European Union Water Initiative plus for Eastern Partnership Countries"

EaP | Eastern Partnership

Jinj

Elaboration

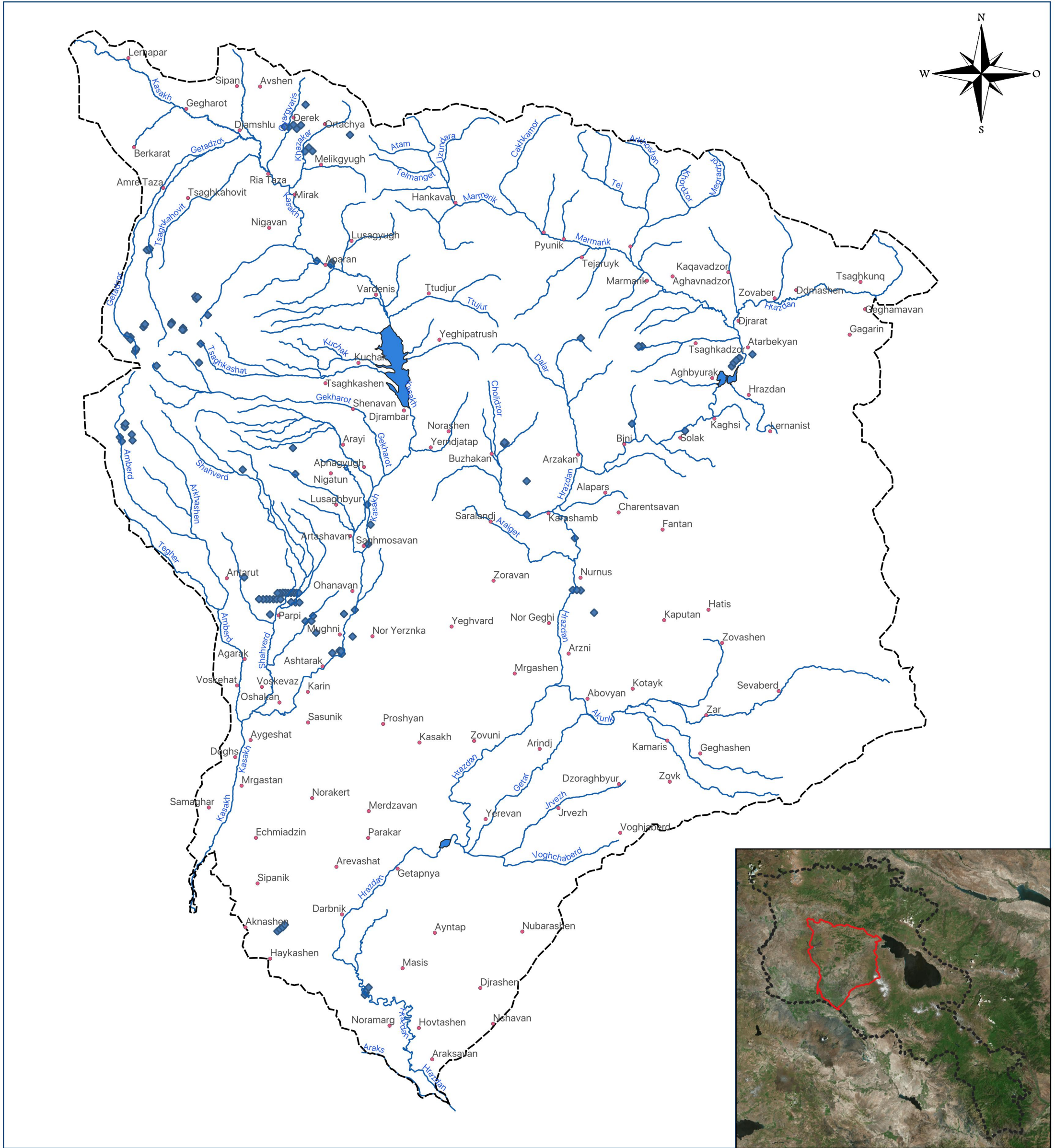
7 February 2019

WGS 84 / UTM zone 38N

3036912

km

Map 4. Location of springs in the Hrazdan RBD



Background layer legend

- Reservoirs
- Hrazdan RBD
- Rivers
- Settlements
- Springs

Data source

RA MEINR Water committee



"European Union Water Initiative plus for Eastern Partnership Countries"



Jinj

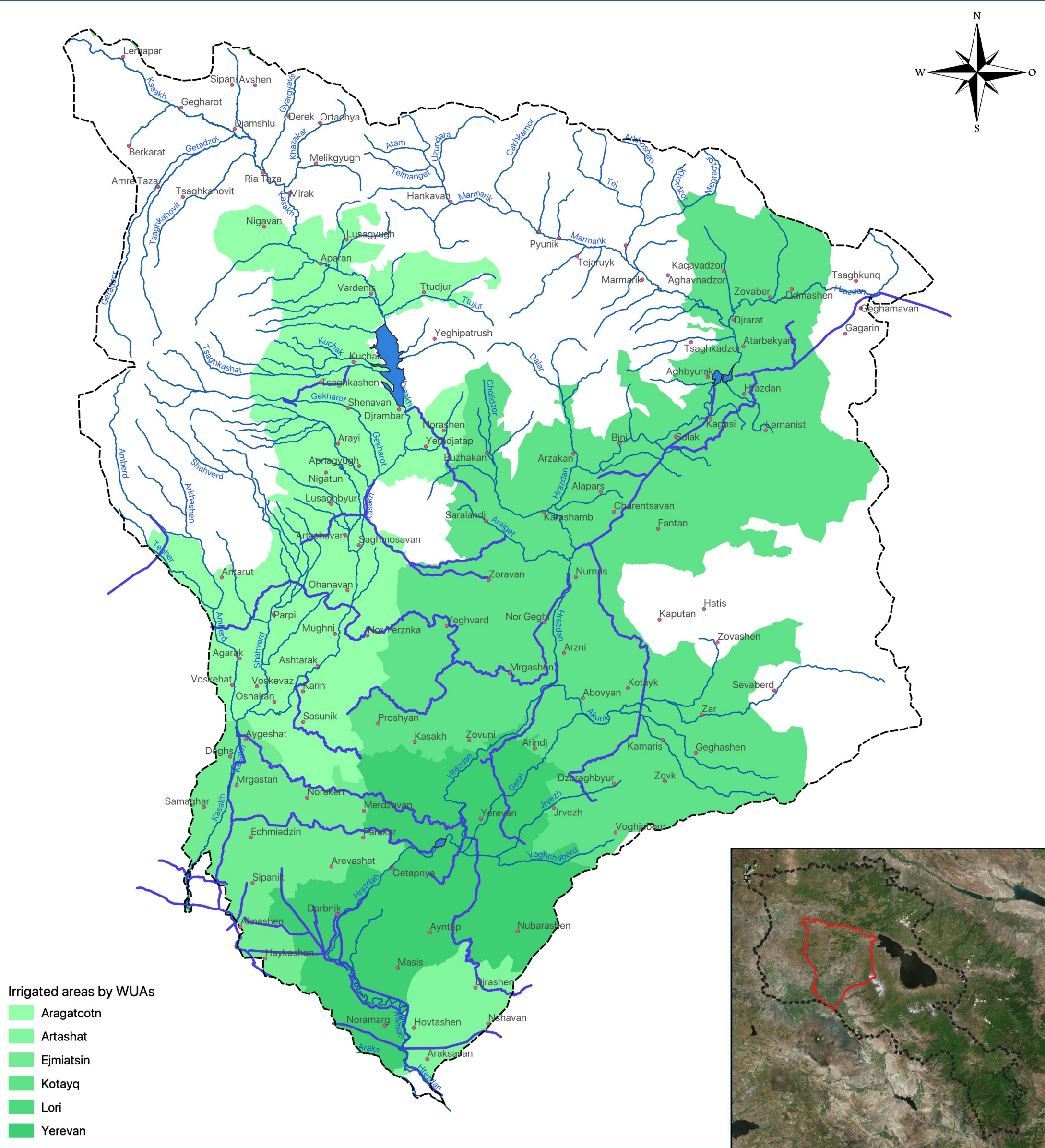
Elaboration

7 February 2019

WGS 84 / UTM zone 38N

3 0 3 6 9 12 km

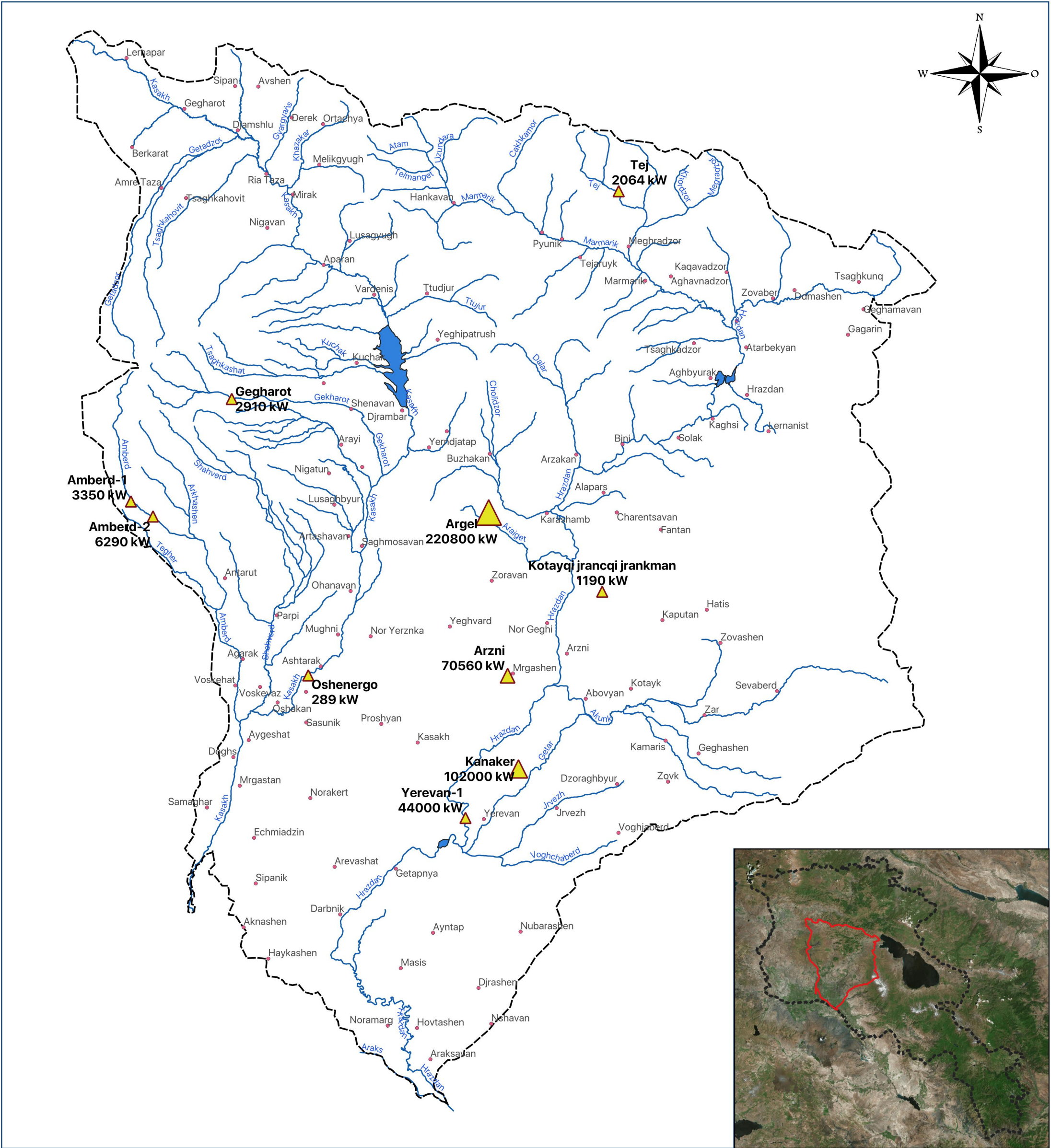
Map 5. Hydraulic systems (including water transfers) and irrigated areas of Hrazdan RBD



Background layer legend	
	Reservoirs
	Hrazdan RBD
	Rivers
	Settlements
	Channels

Data source	
RA MEINR Water committee	
	"European Union Water Initiative plus for Eastern Partnership Countries"
Jinj	
Elaboration	WGS 84 / UTM zone 38N
7 February 2019	

Map 6. HPPs location and energy generation in the Hrazdan RBD



Background layer legend

- Reservoirs
- Hrazdan RBD
- Rivers
- Settlements
- HPPs

Data source

RA MNP, Water Resource Management Agency



"European Union Water Initiative plus for Eastern Partnership Countries"

Jinj

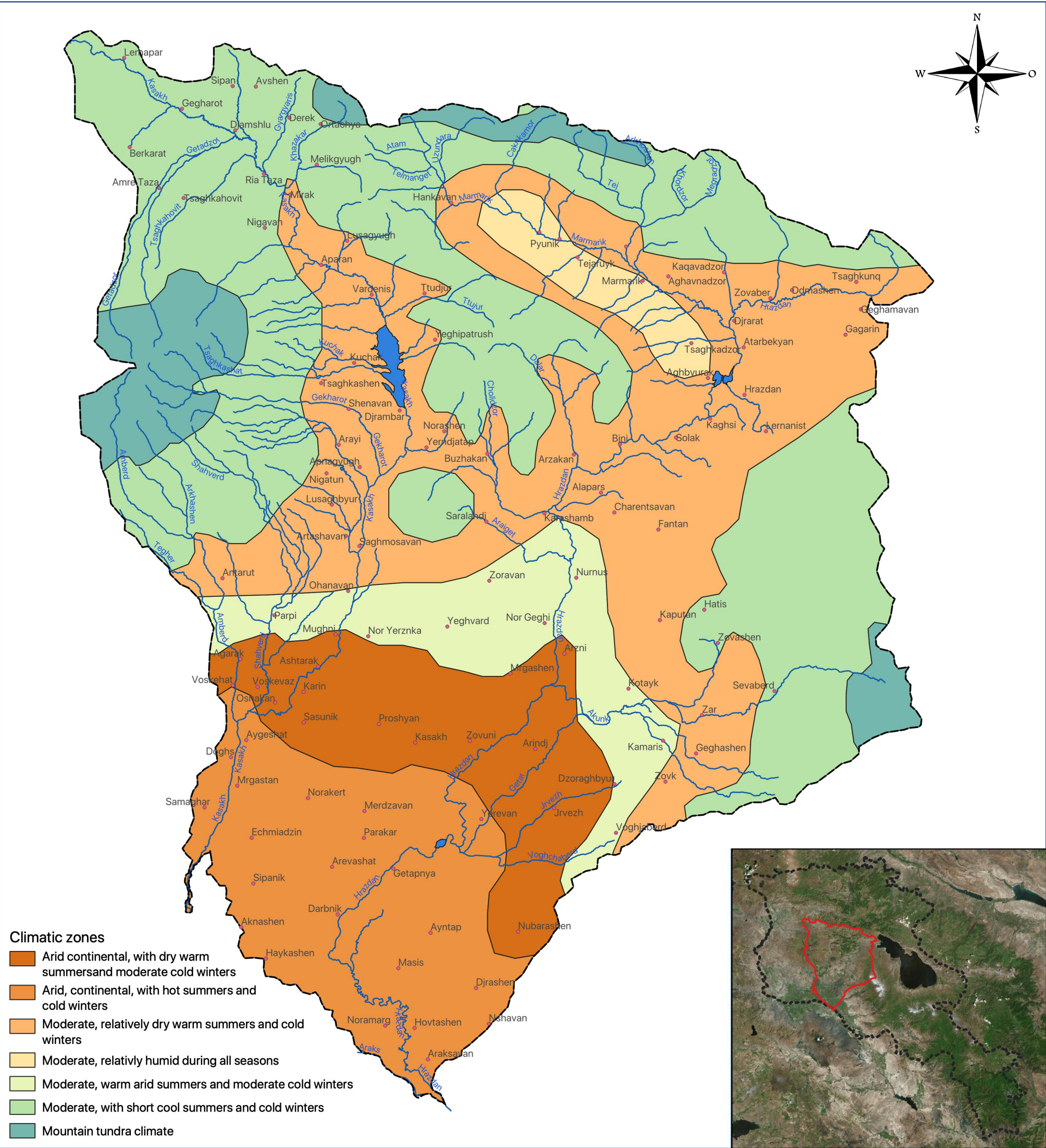
Revision

26 February 2019

WGS 84 / UTM zone 38N

3 0 3 6 9 12 km

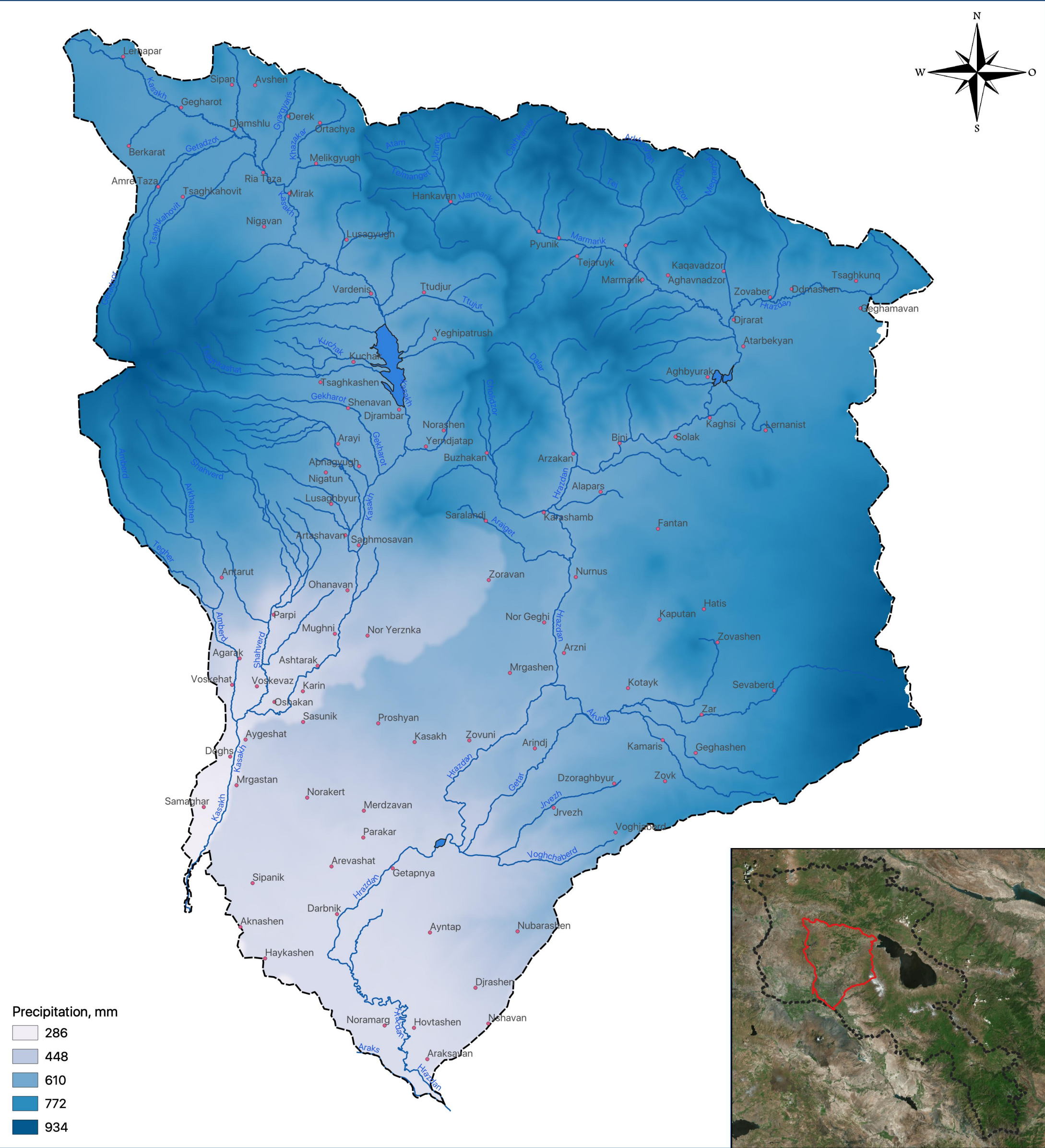
Map 7. Climatic zones in Hrazdan RBD



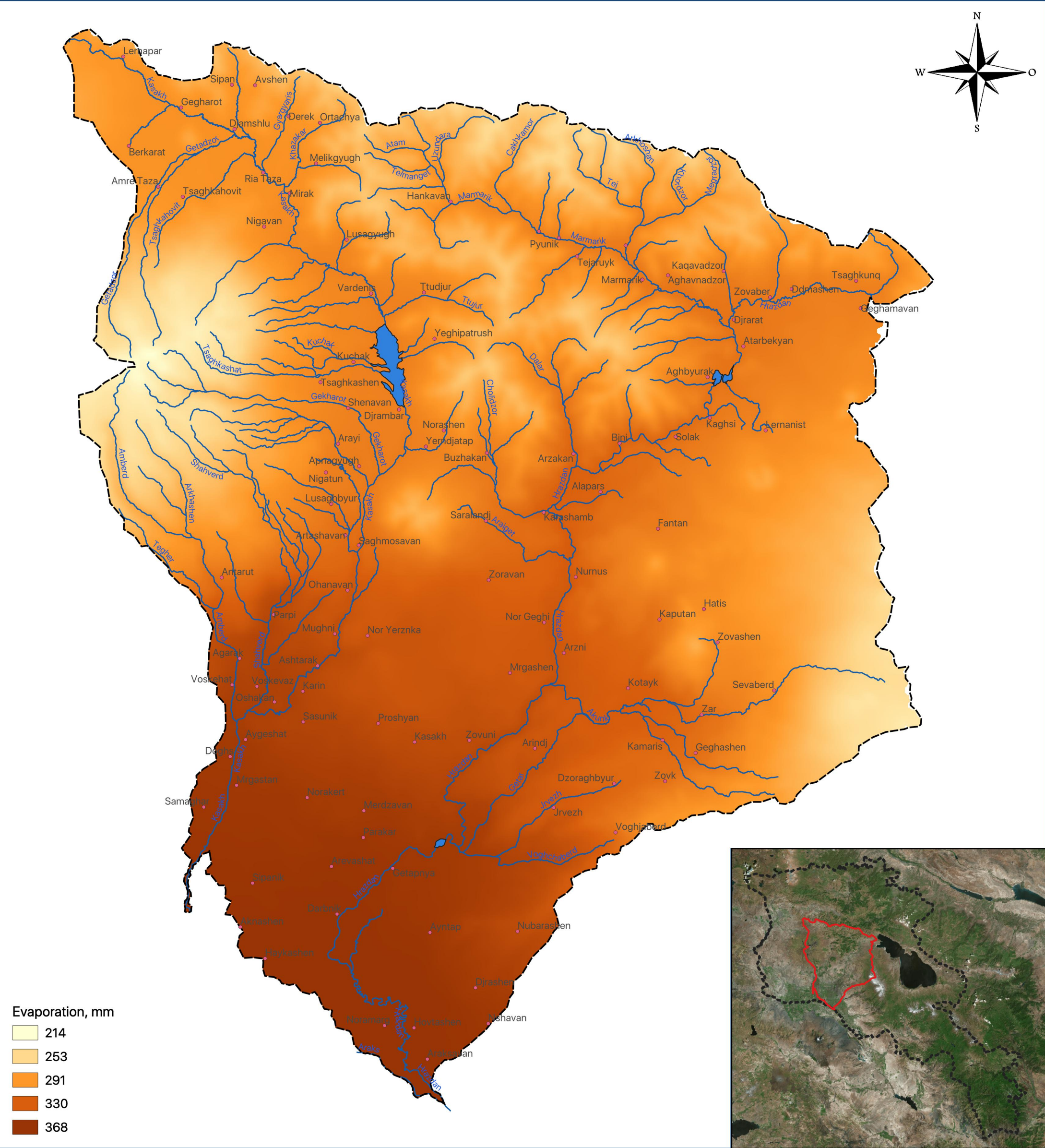
Background layer legend	
	Reservoirs
	Hrazdan RBD
	Rivers
	Settlements

Data source	
RA MES	
	"European Union Water Initiative plus for Eastern Partnership Countries"
Jinj	
Revision	WGS 84 / UTM zone 38N
12 December 2018	

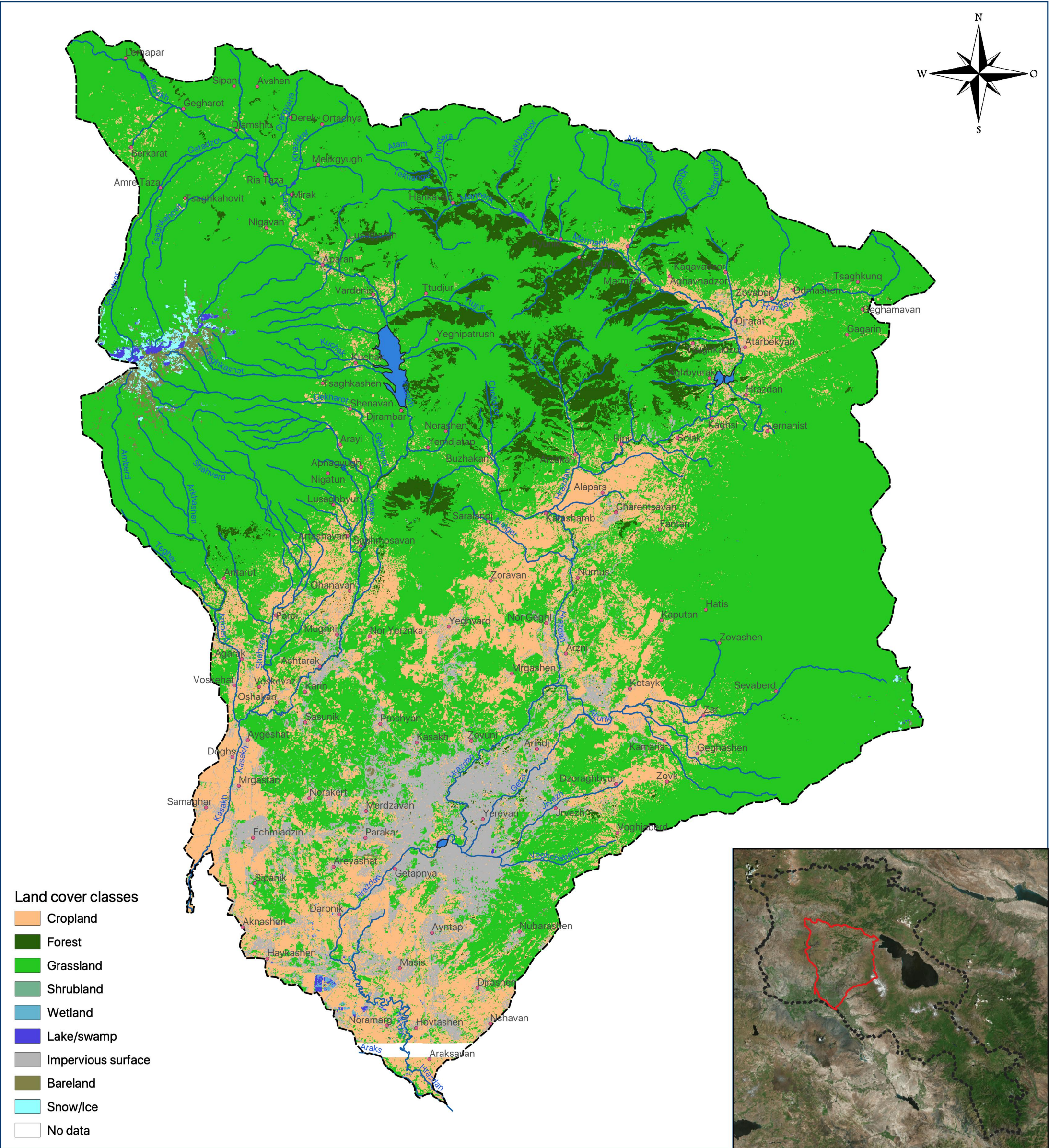
Map 8. Map of the precipitation in Hrazdan RBD



Map 9. Map of the evaporation in Hrazdan RBD



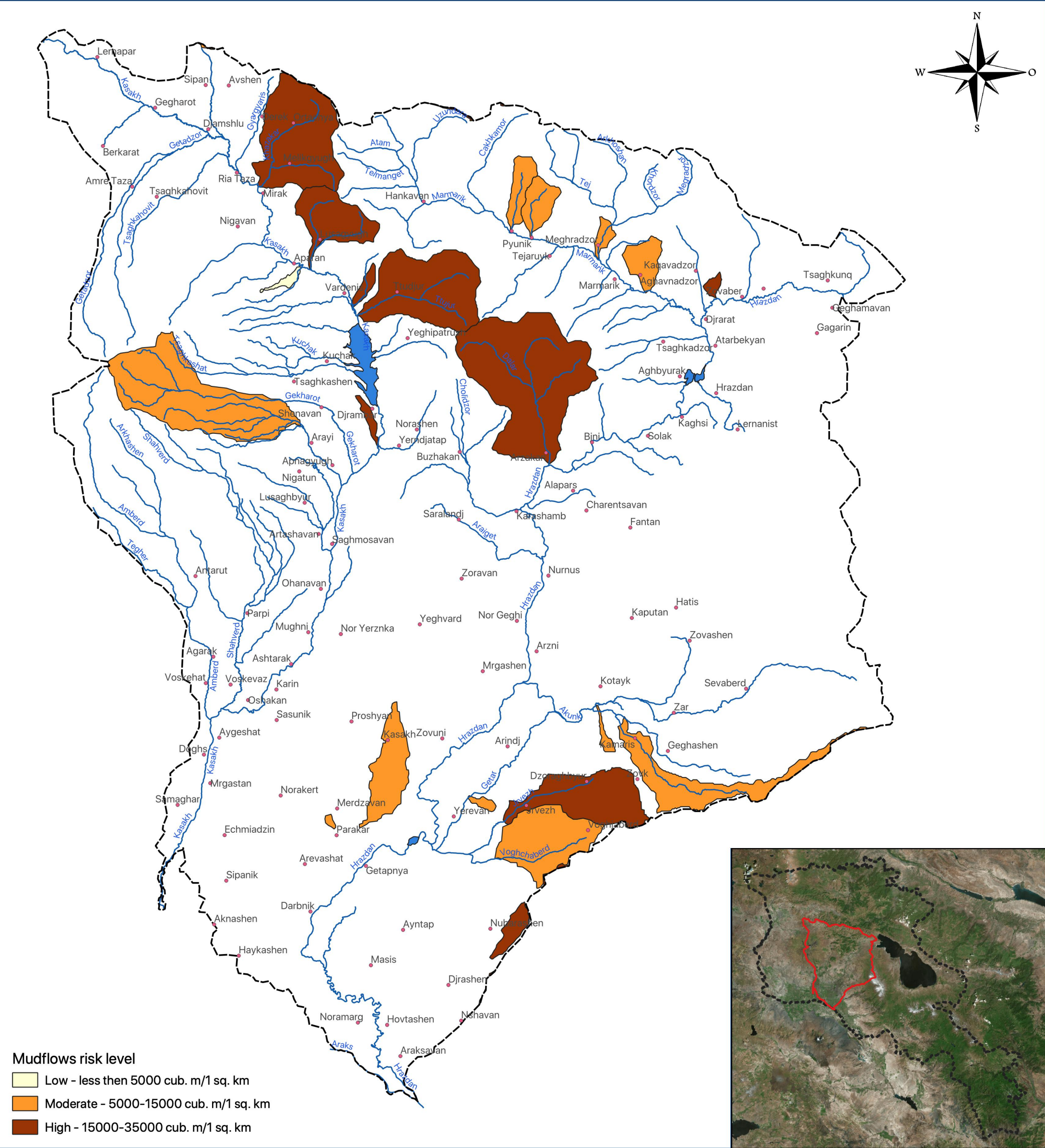
Map 10. Land cover map for Hrazdan RBD



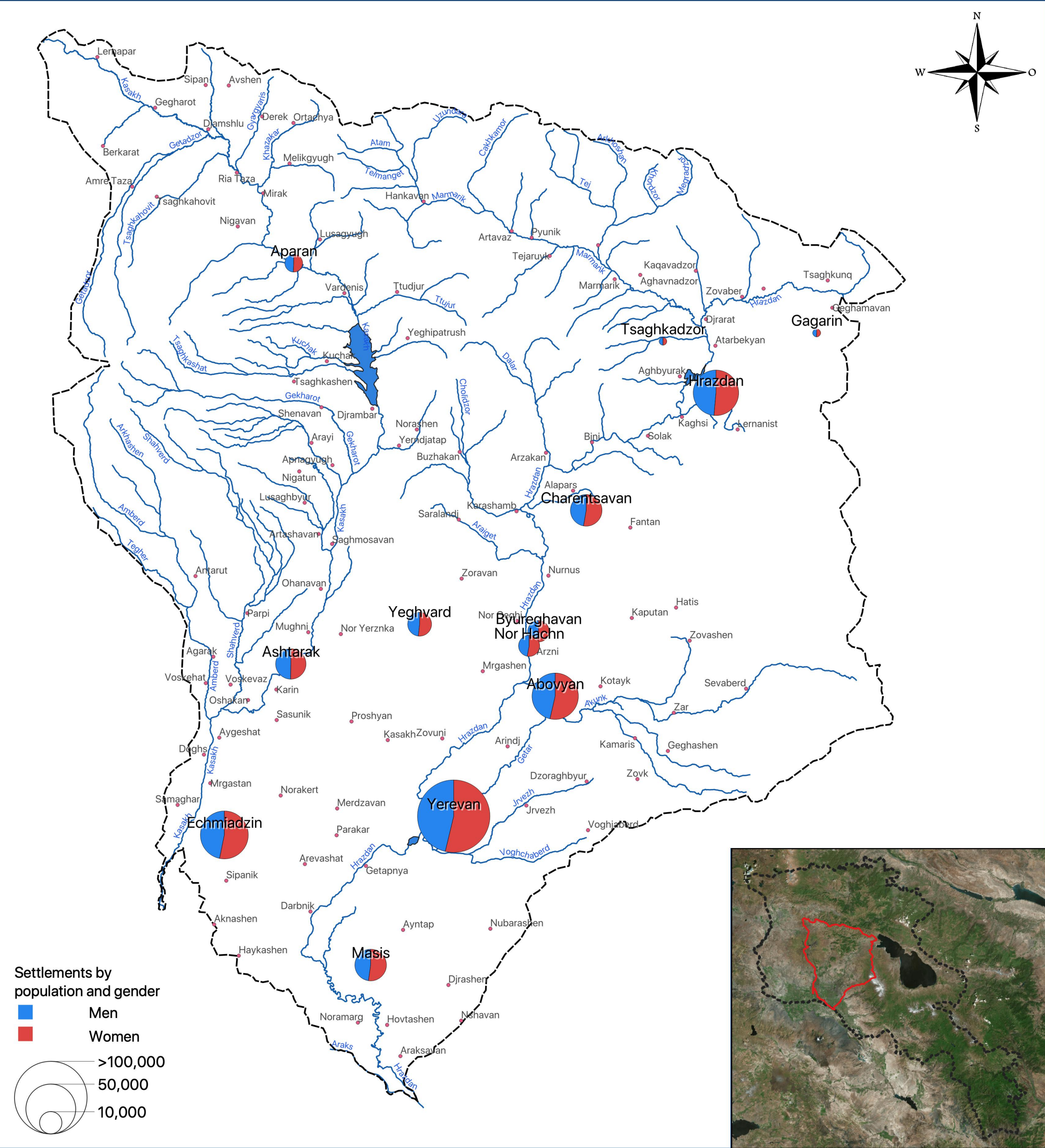
Background layer legend	
	Reservoirs
	Hrazdan RBD
	Rivers
	Settlements

Data source	
FROM-GLC 2017v1, http://data.ess.tsinghua.edu.cn/fromglc2017v1.html	
	"European Union Water Initiative plus for Eastern Partnership Countries"
Jinj	
Elaboration	WGS 84 / UTM zone 38N
5 January 2019	3 0 3 6 9 12 km

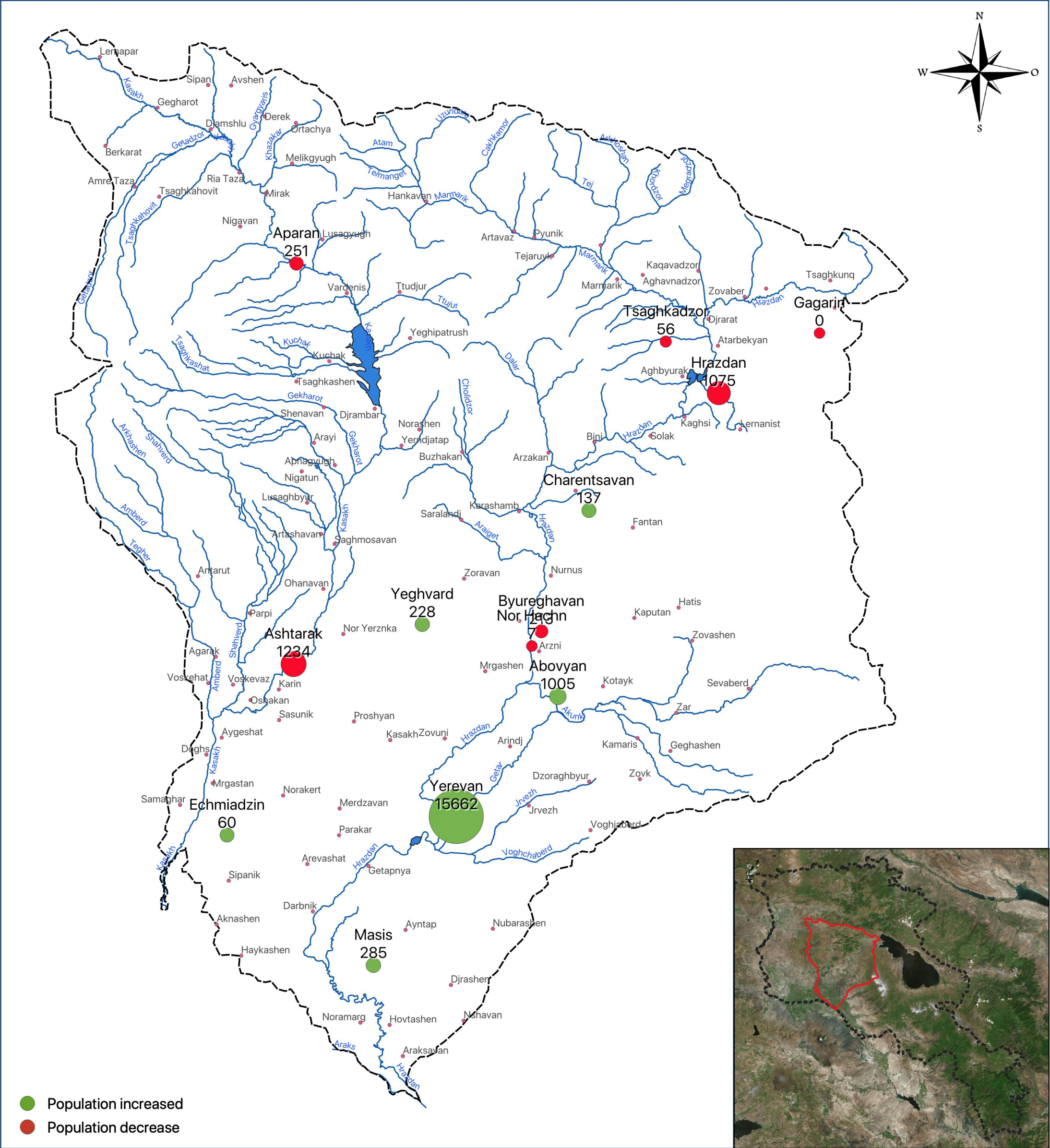
Map 11. Mudflow risk in Hrazdan RBD



Map 12. Map of the population and gender for 2011



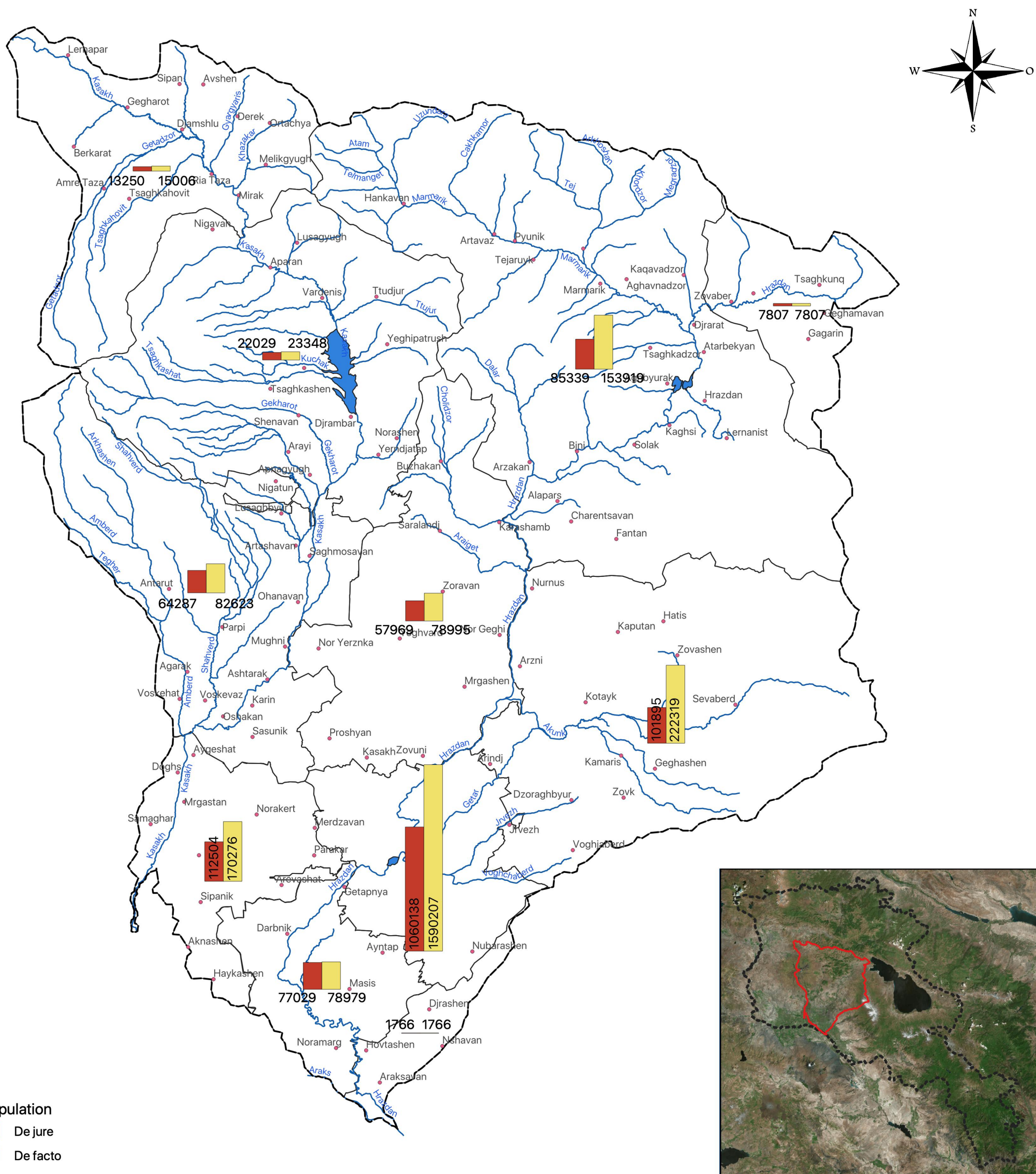
Map 13. Map of the population change in Hrazdan RBD during 2011-2017



Background layer legend	
	Reservoirs
	Hrazdan RBD
	Rivers
	Settlements

Data source	
RA Statistical Committee	
	"European Union Water Initiative plus for Eastern Partnership Countries"
Jinj	
Revision	WGS 84 / UTM zone 38N
14 December 2018	3 0 3 6 9 12 km

Map 14. De jure and De facto population in Hrazdan RBD



Background layer legend

 Reservoirs
 Hrazdan RBD
 Rivers
 Settlements

Data source

RA Statistical Committee



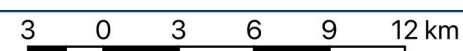
"European Union Water Initiative plus for Eastern Partnership Countries"

Jinj

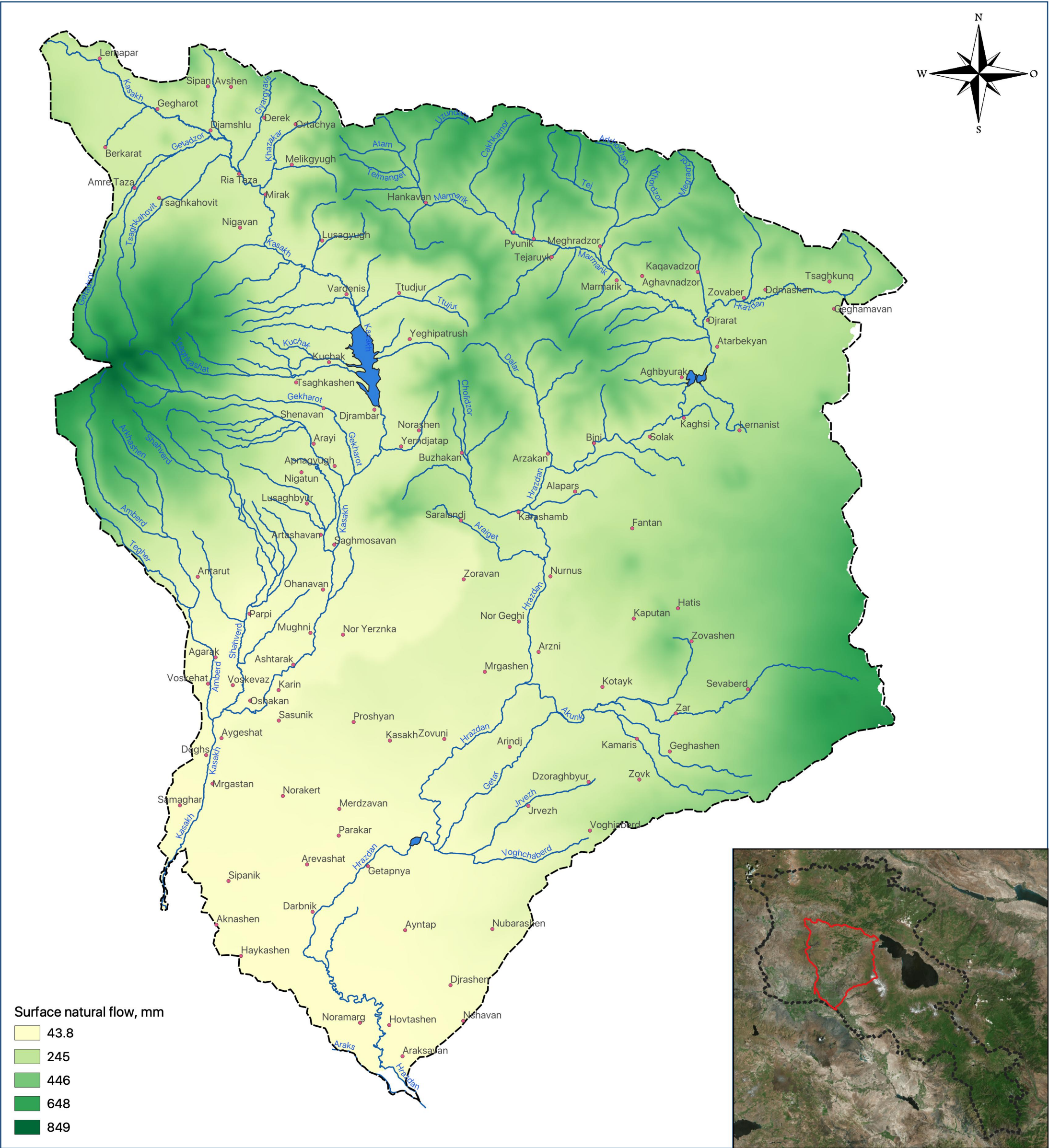
Revision

WGS 84 / UTM zone 38N

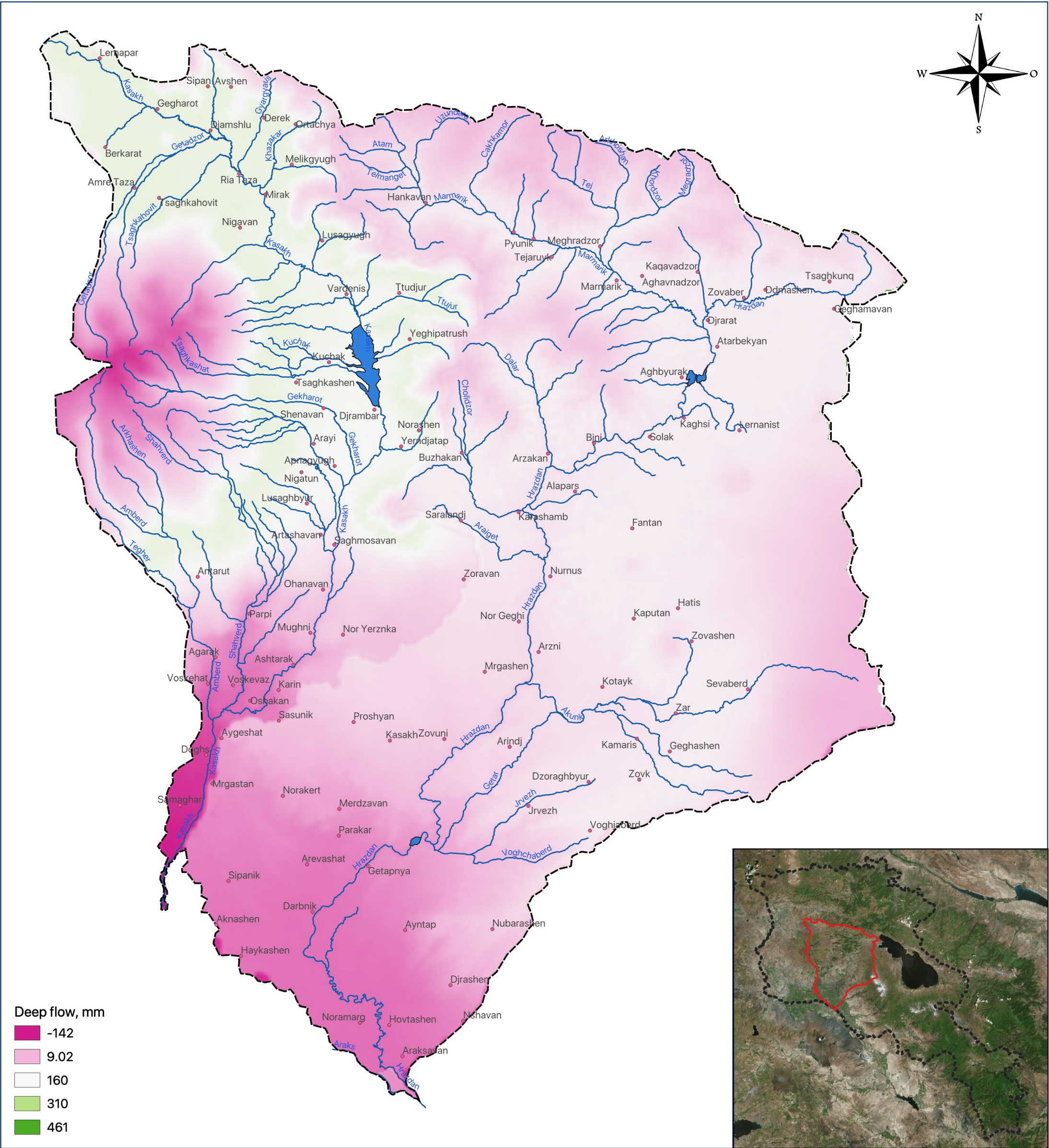
14 December 2018



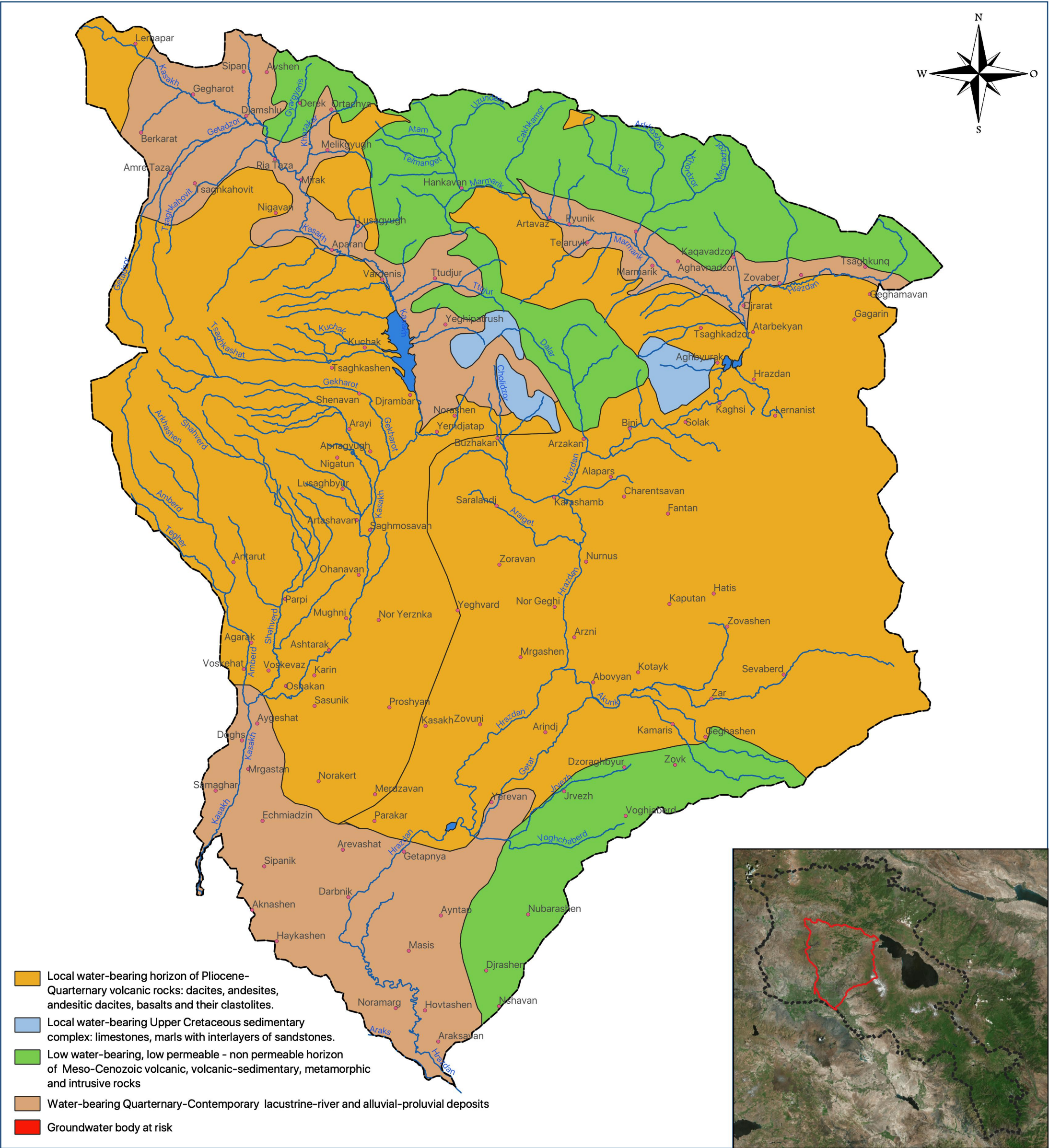
Map 15. Map of the surface natural flow in Hrazdan RBD



Map 16. Map of the deep flow in Hrazdan RBD



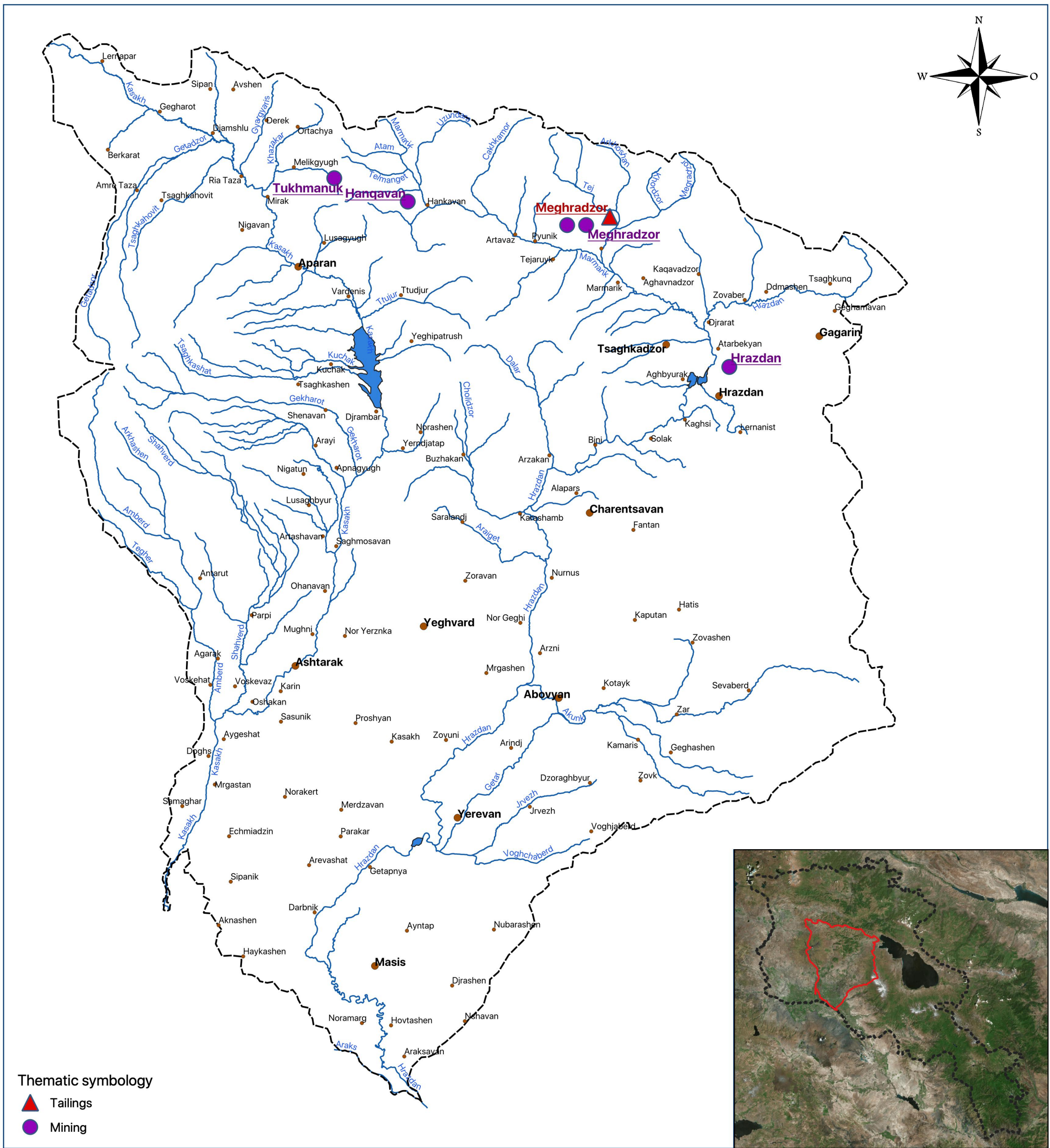
Map 17. Groundwater bodies in the Hrazdan RBD



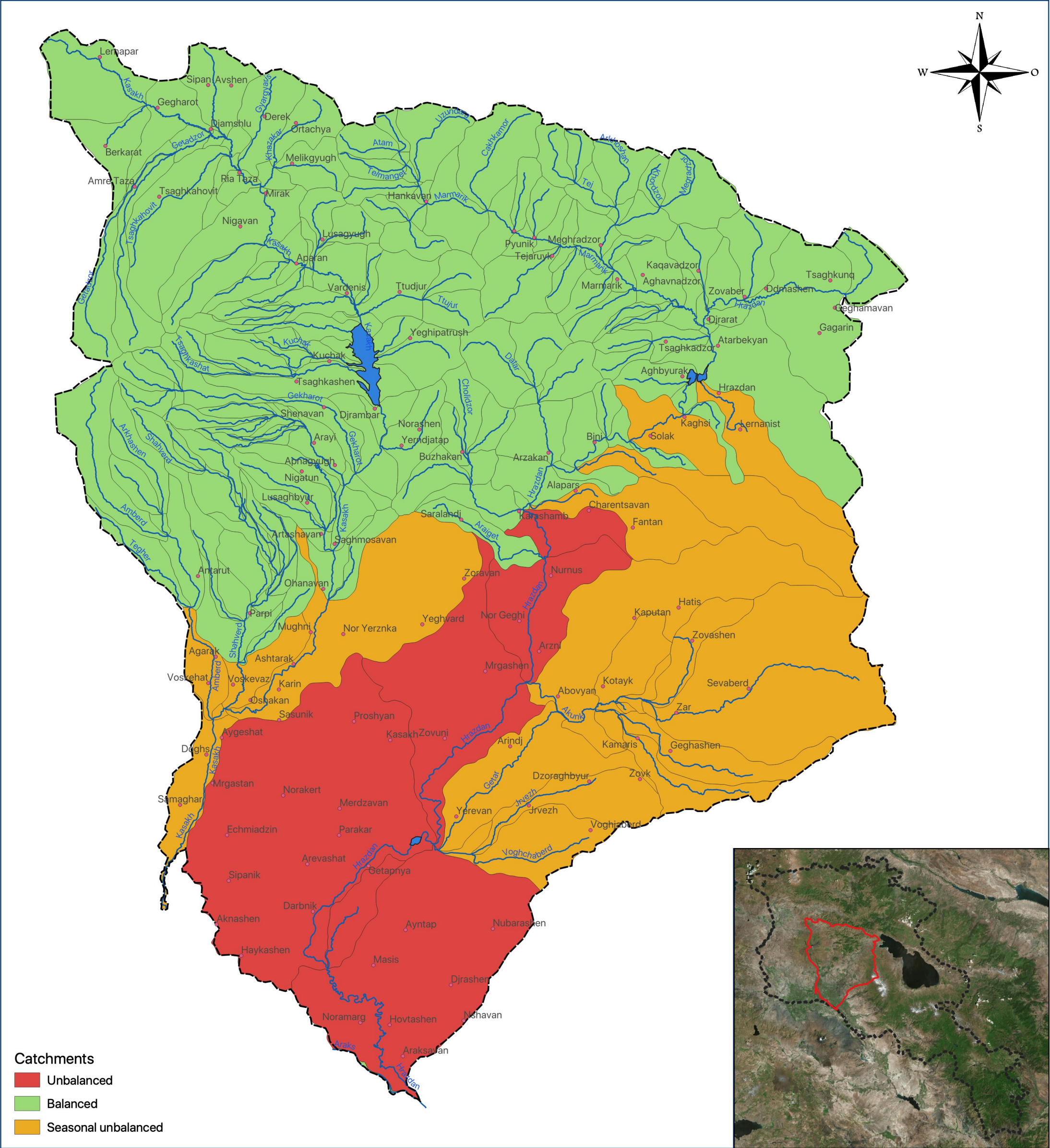
Background layer legend	
	Reservoirs
	Hrazdan RBD
	Rivers
	Settlements

Data source	
H.Aghinyan and A.Hakobyan based on the geological map of 1:200000 scale elaborated by A.Aslanyan and A.Vehuni	
	"European Union Water Initiative plus for Eastern Partnership Countries"
Jinj	
Revision	WGS 84 / UTM zone 38N
19 December 2018	

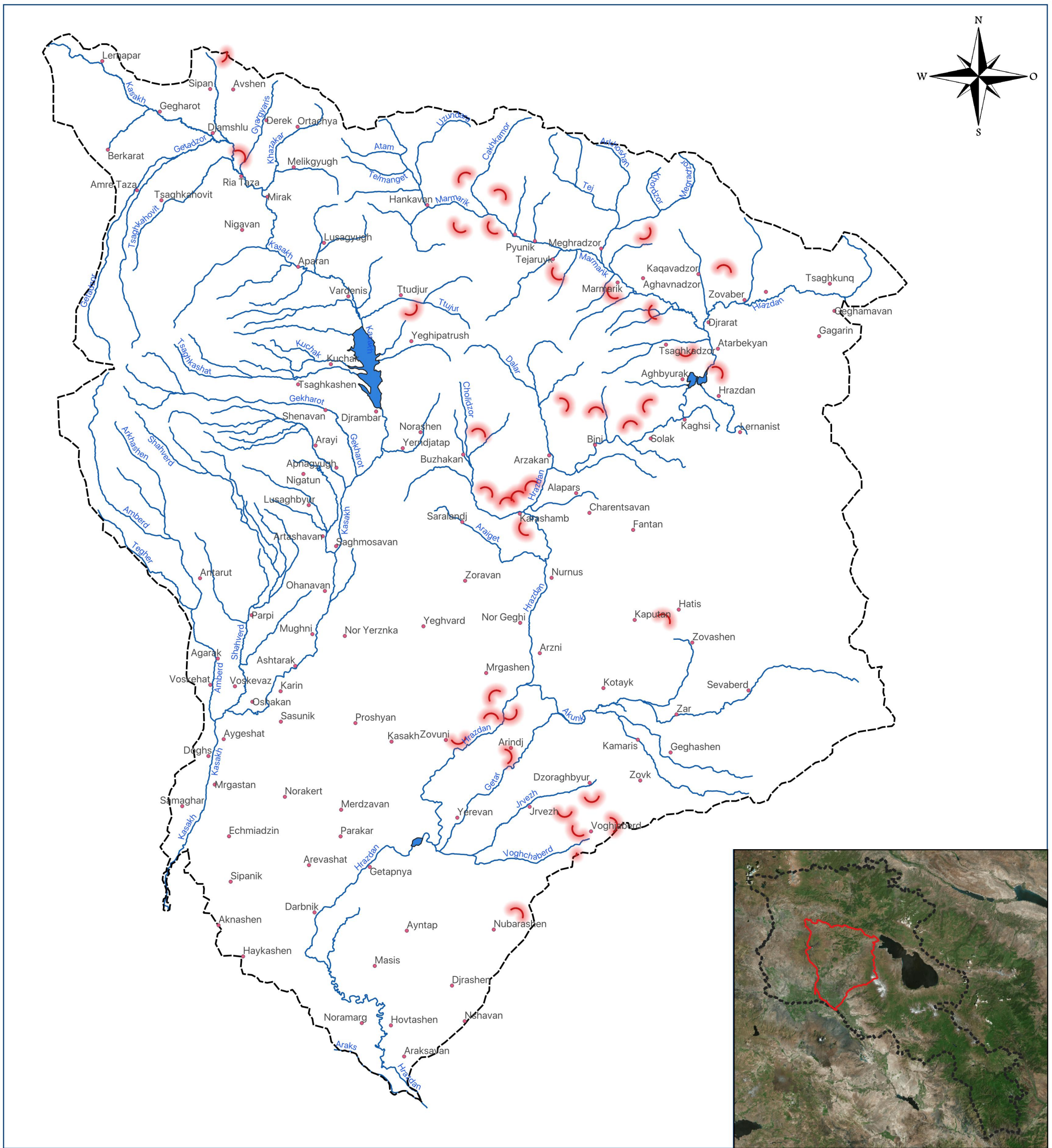
Map 18. Map of mining areas in Hrazdan RBD



Map 19. Water balance in the Hrazdan RBD for 2016



Map 20. Landslides in Hrazdan RBD



Background layer legend

- Reservoirs
- Hrazdan RBD
- Rivers
- Settlements
- Landslides

Data source

RA MES



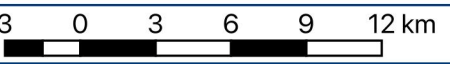
"European Union Water Initiative plus for Eastern Partnership Countries"

Jinj

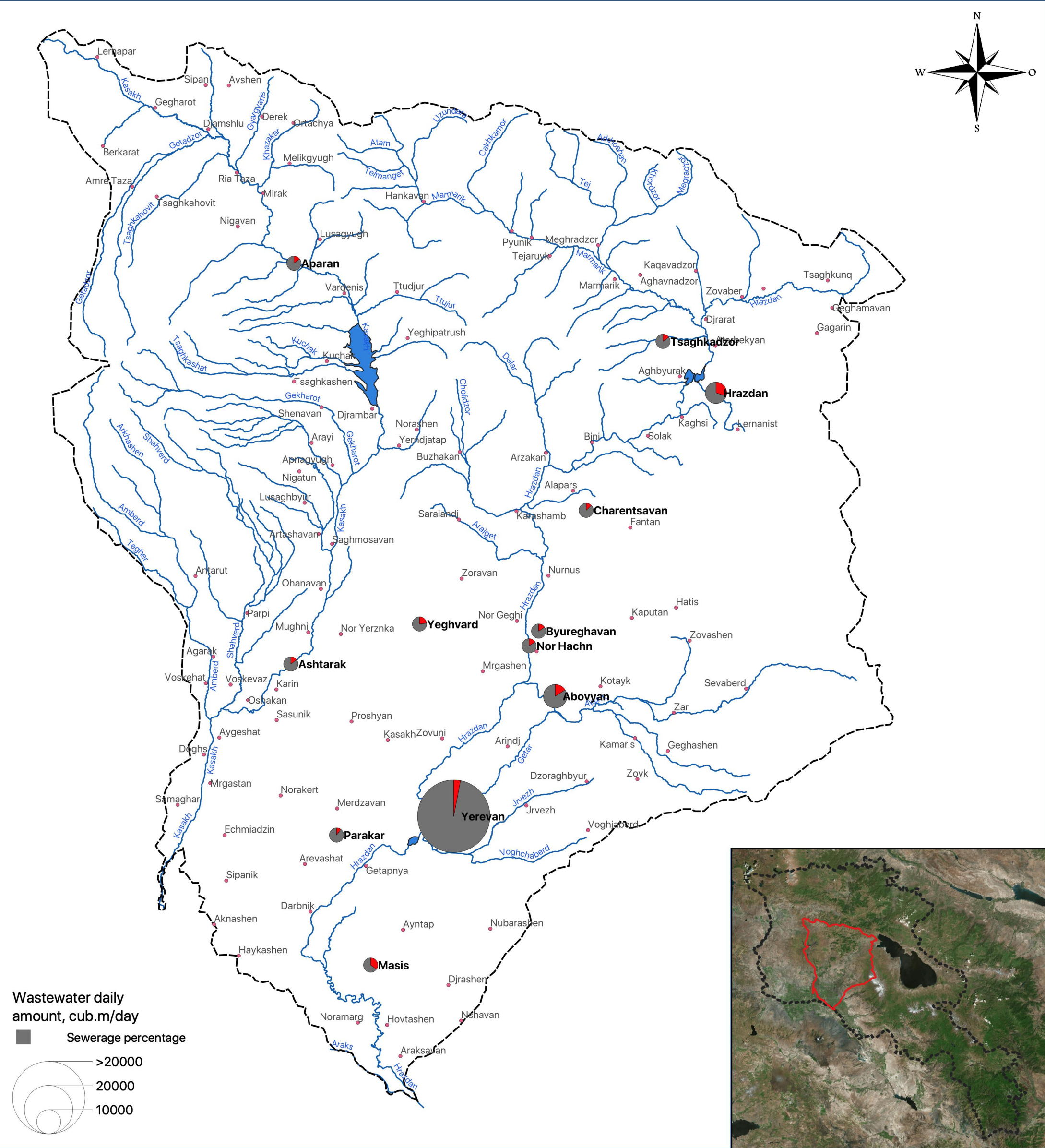
Revision

26 December 2018

WGS 84 / UTM zone 38N



Map 21. Map of municipal wastewater treatment in Hrazdan RBD



Background layer legend

- Reservoirs
- Hrazdan RBD
- Rivers
- Settlements

Data source

Water Committee of RA MEINR, Jinj



"European Union Water Initiative plus for Eastern Partnership Countries"

Jinj

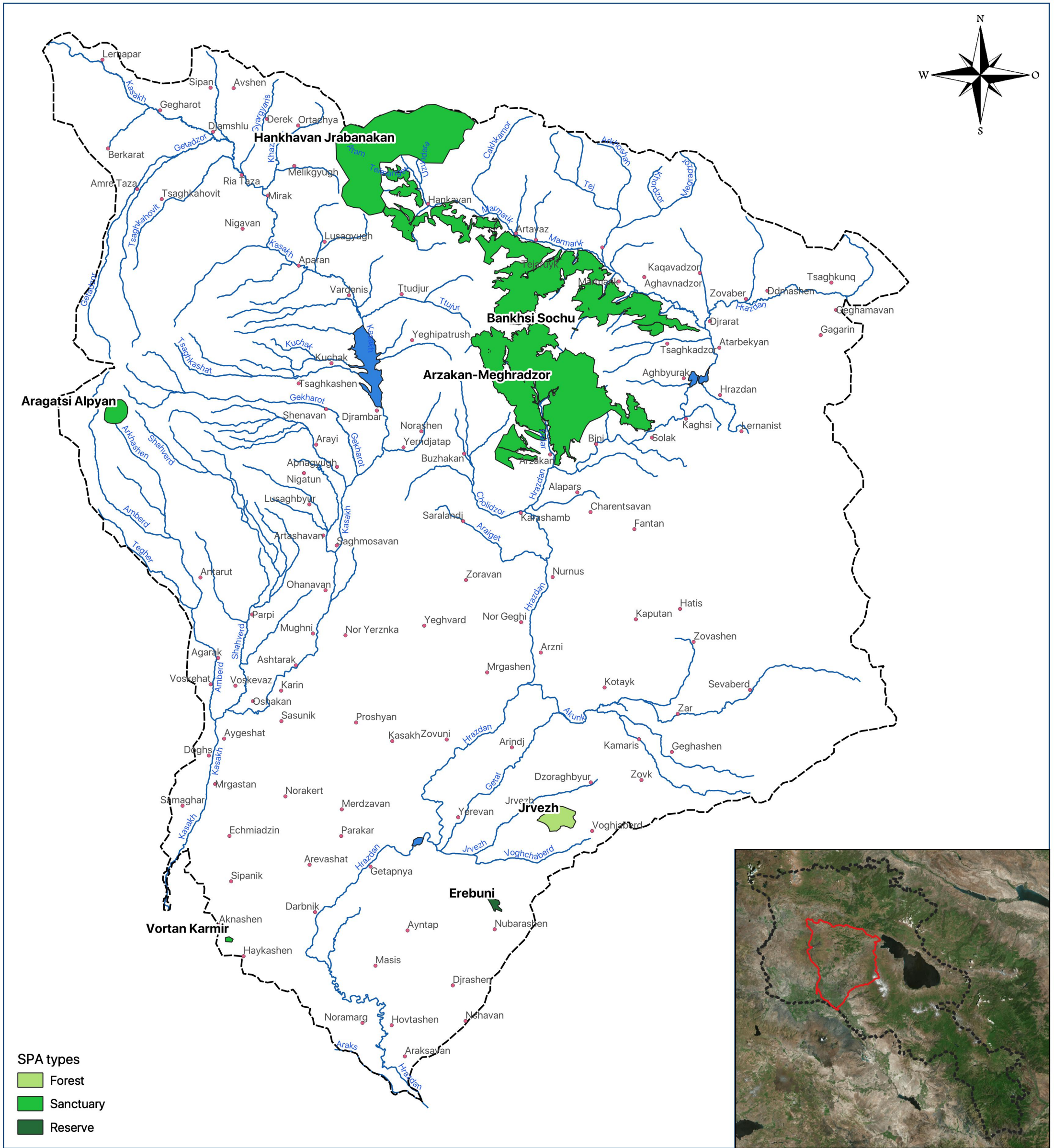
Revision

26 December 2018

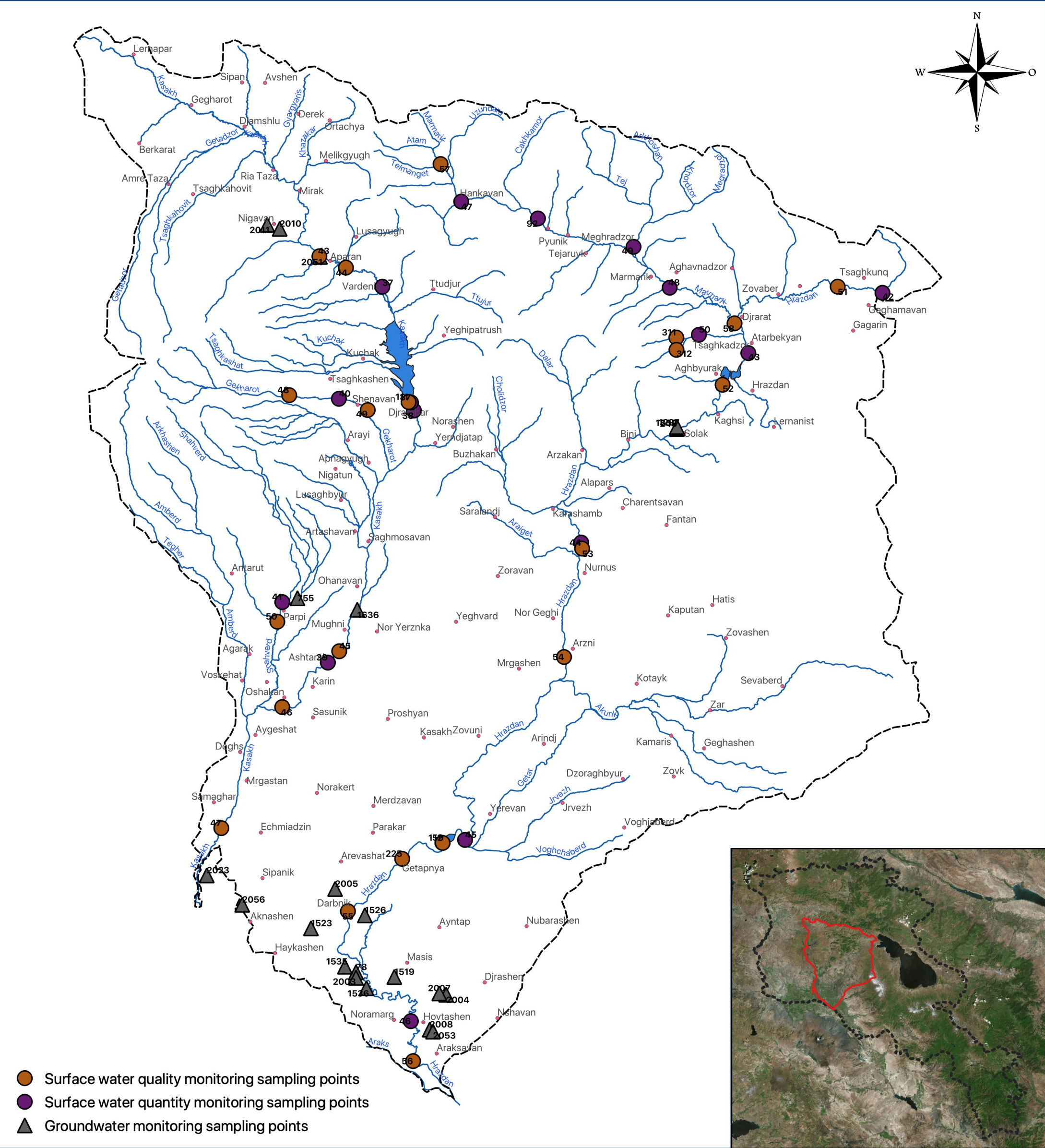
WGS 84 / UTM zone 38N

3 0 3 6 9 12 km

Map 22. SPAs in the Hrazdan RBD



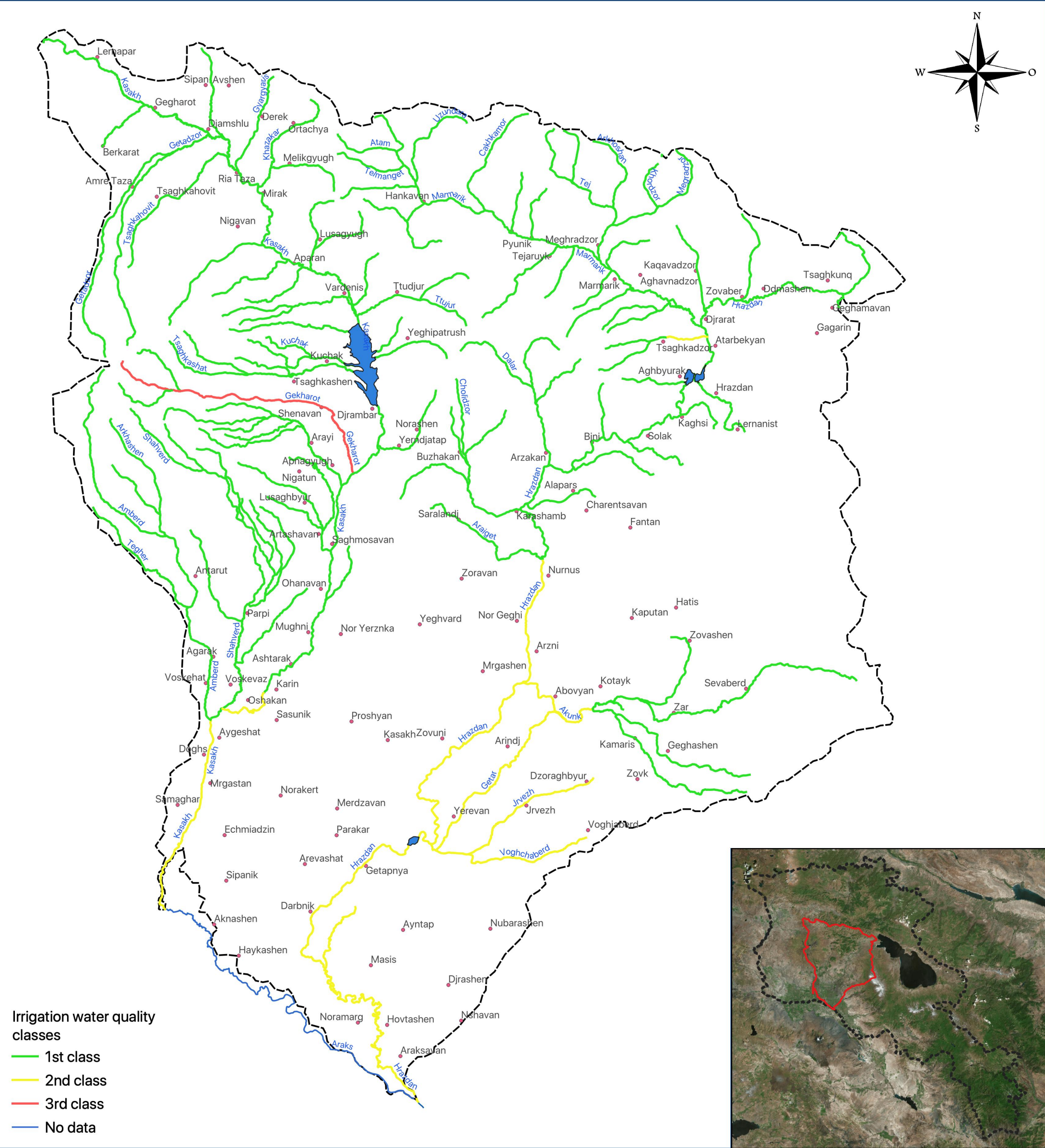
Map 23. Water monitoring network of the Hrazdan RBD



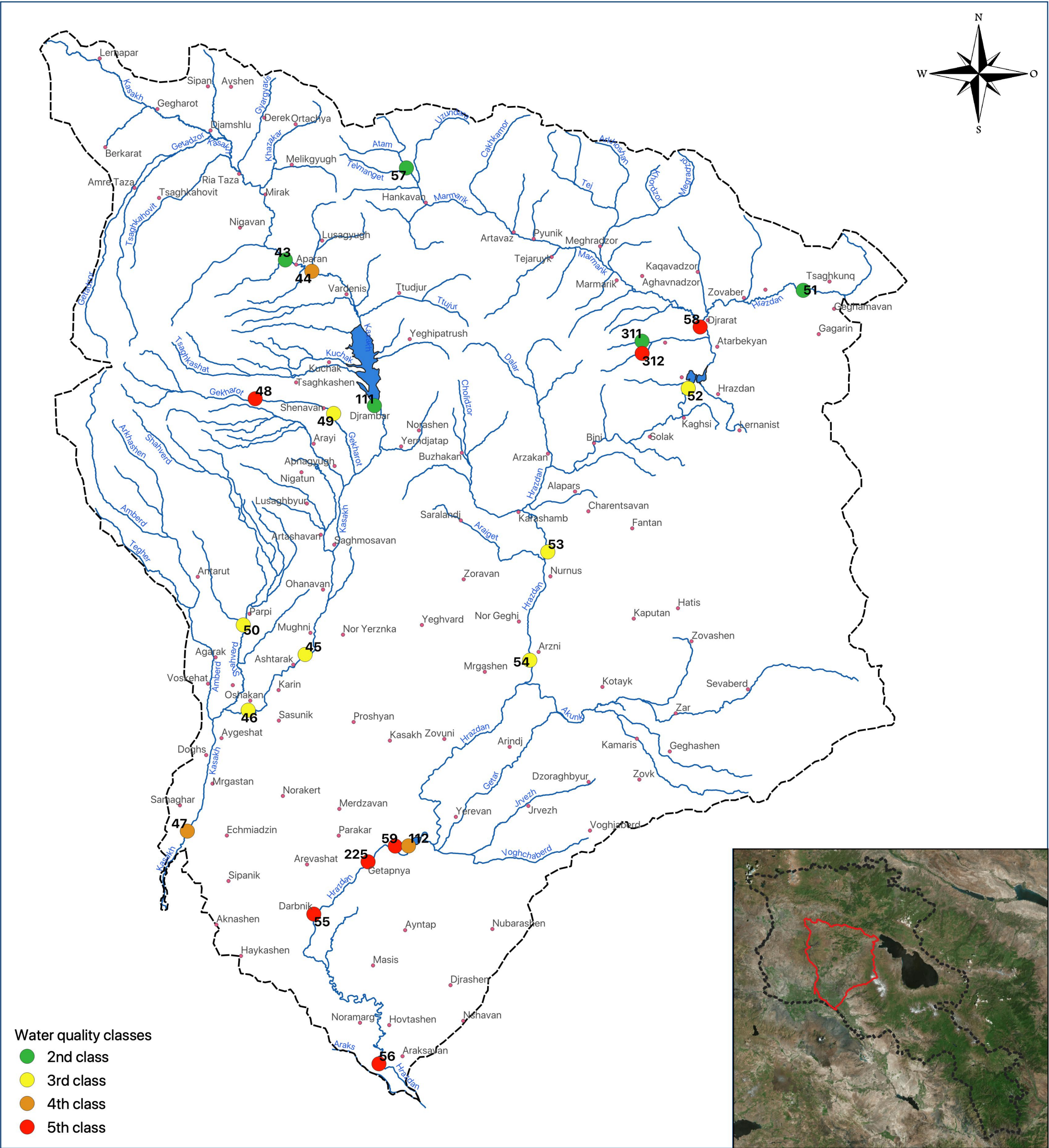
Background layer legend	
	Reservoirs
	Hrazdan RBD
	Rivers
	Settlements

Data source	
RA MNP EMIC and MES Armhydromet service	
	"European Union Water Initiative plus for Eastern Partnership Countries"
Jinj	
Revision	WGS 84 / UTM zone 38N
18 January 2019	

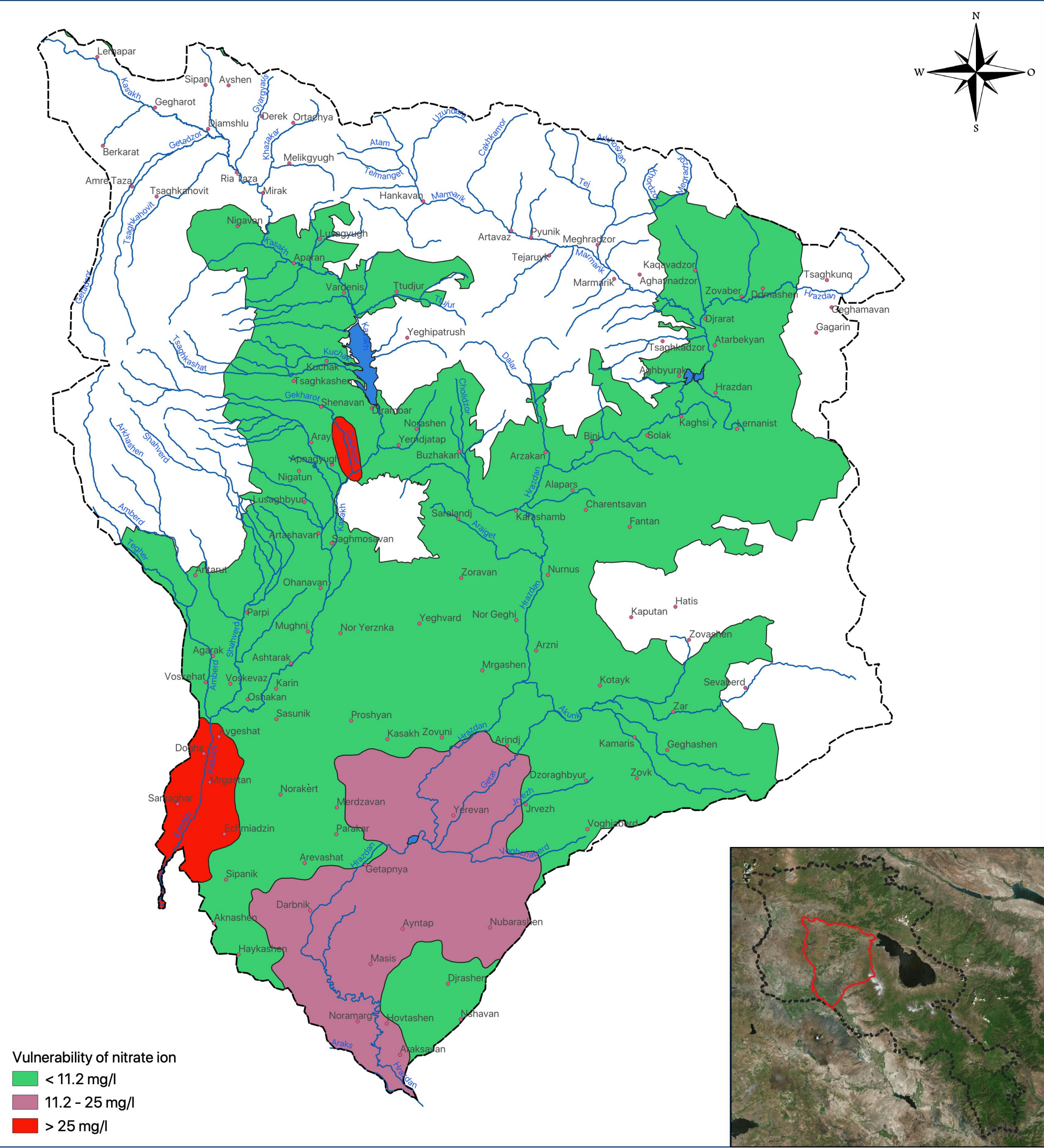
Map 24. Water suitability for irrigation use in the Hrazdan RBD



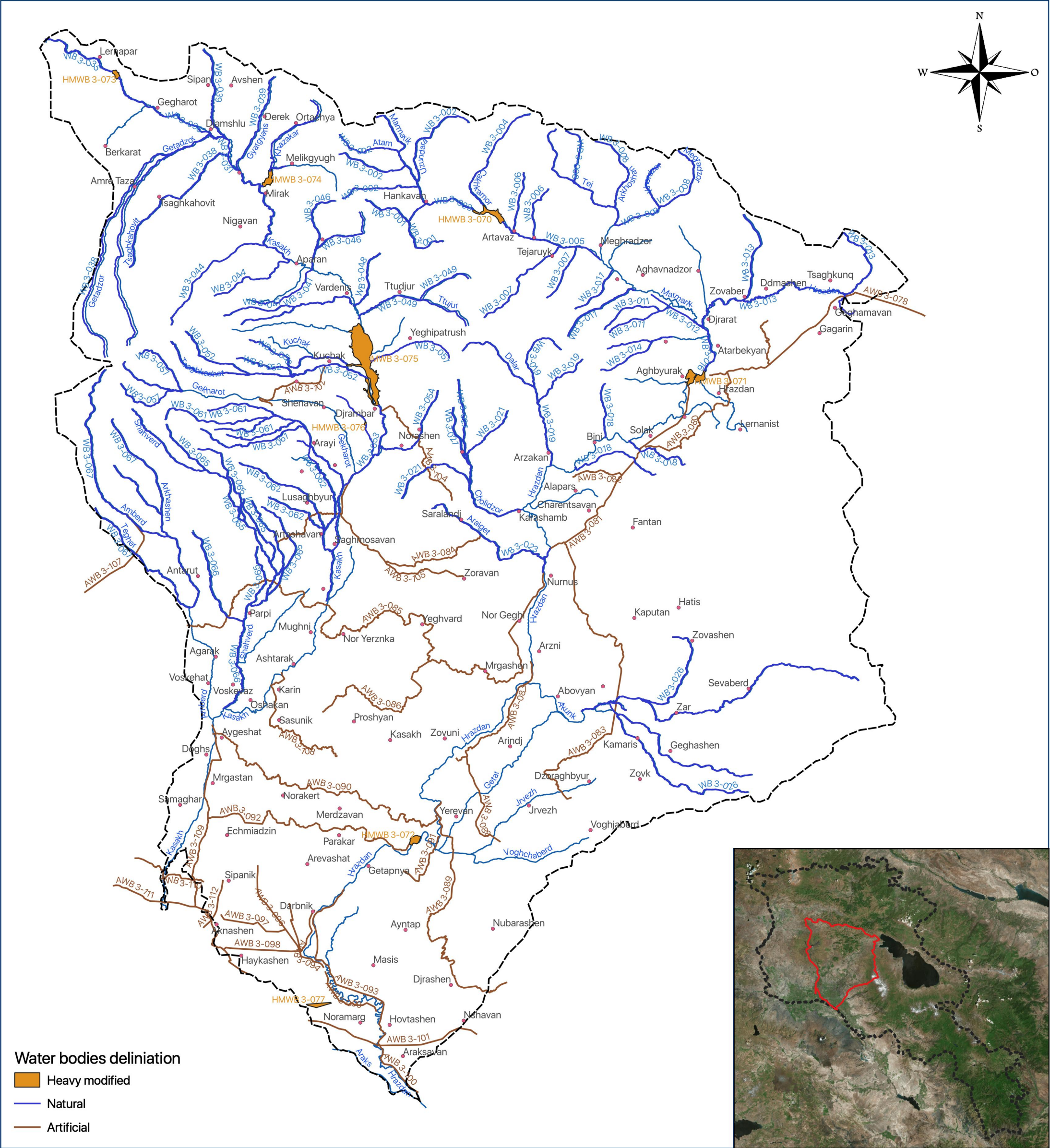
Map 25. Surface water quality classification in Hrazdan RBD



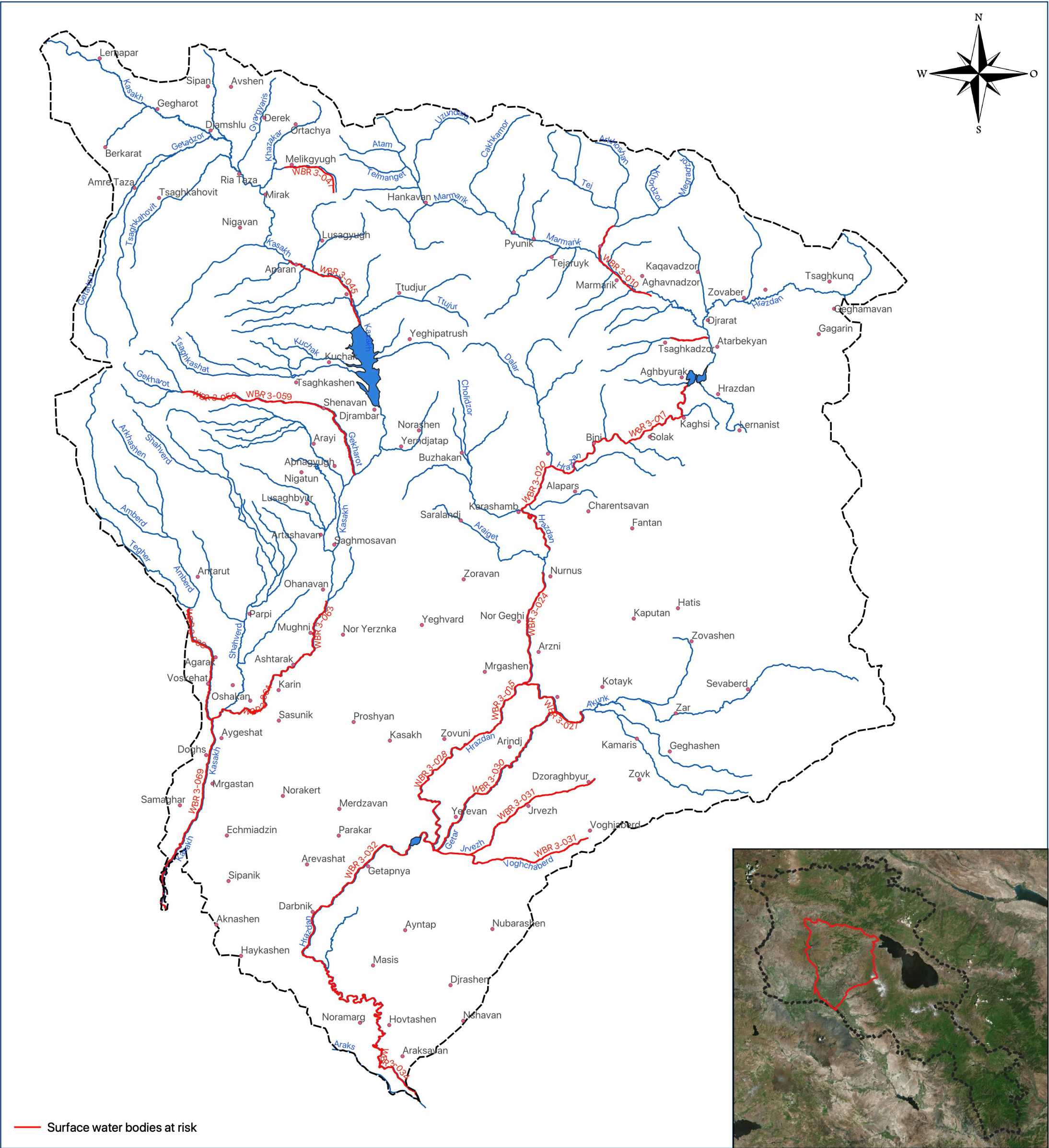
Map 26. Vulnerability of nitrate ion in Hrazdan RBD



Map 27. Natural, artificial and heavy modified surface water bodies in the Hrazdan RBD



Map 28. Surface water bodies at risk in the Harzdan RBD



Background layer legend

- Reservoirs
- Hrazdan RBD
- Rivers
- Settlements

Data source

RA MNP "Environmental Monitoring and Information Center" SNCO



"European Union Water Initiative plus for Eastern Partnership Countries"

Jinj

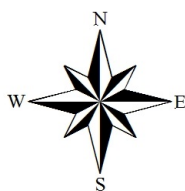
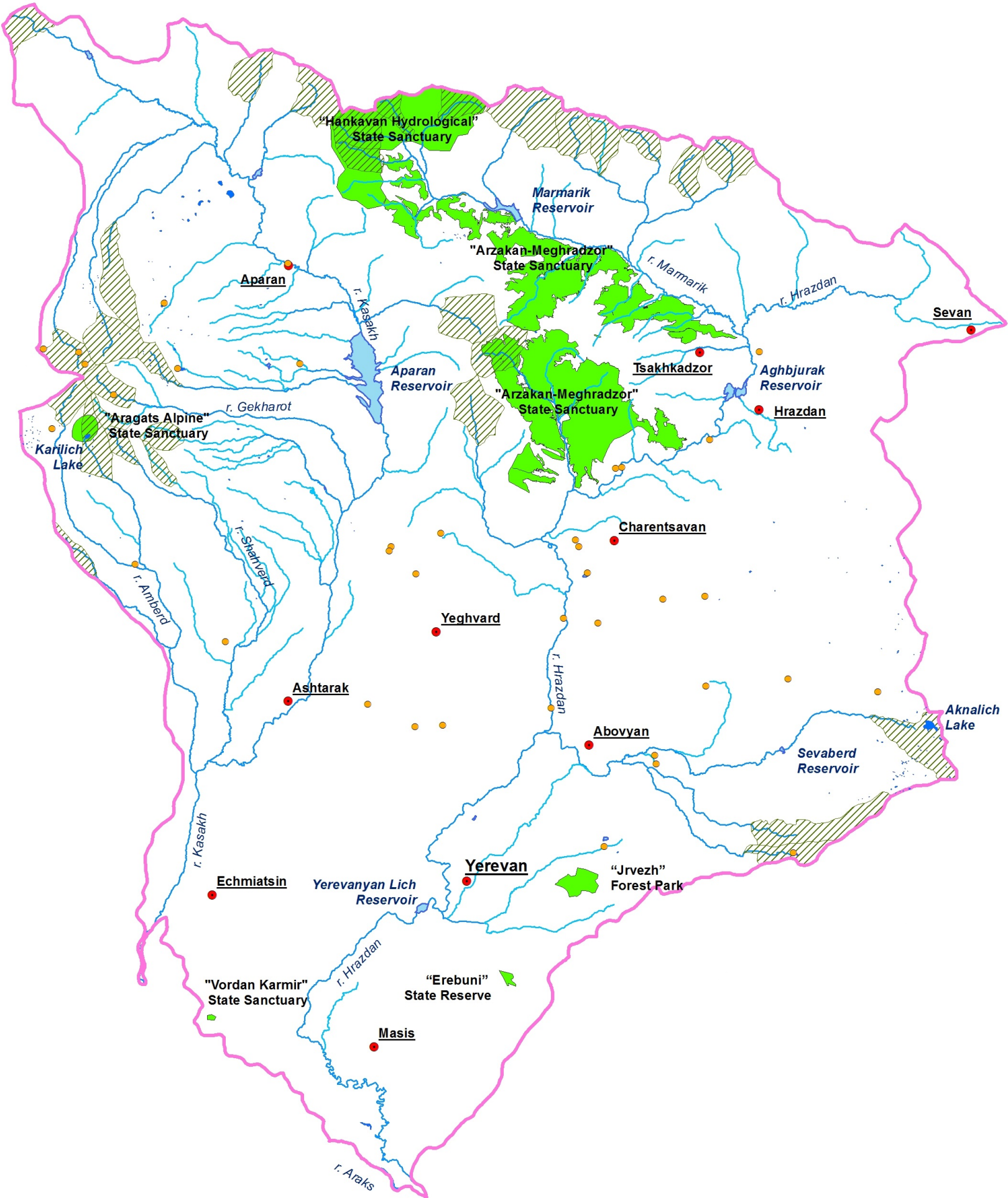
Revision

20 February 2019

WGS 84 / UTM zone 38N

3 0 3 6 9 12 km

Protected Areas, Natural Monuments and Flow Formation Zones of Hrazdan RBD



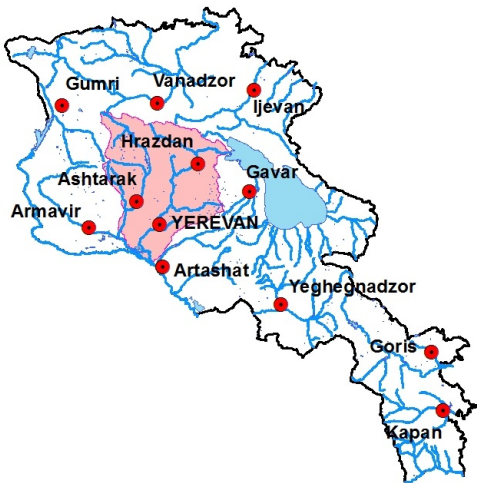
Thematic symbology

- Natural Monuments
- Protected Areas
- Flow Formulation Zones

Background layer legend

- Towns Main
- Reservoirs
- Lakes
- Rivers
- Hrazdan Basin

Location Map



Systeme Coordination
Reference

WGS 84

Scale

1 : 350 000

Data source

Hydromet, "Environmental Monitoring and Information Center",
Hrazdan BMO



"European Union Water Initiative plus for
Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

10.10.2019

Path

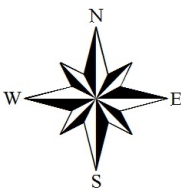
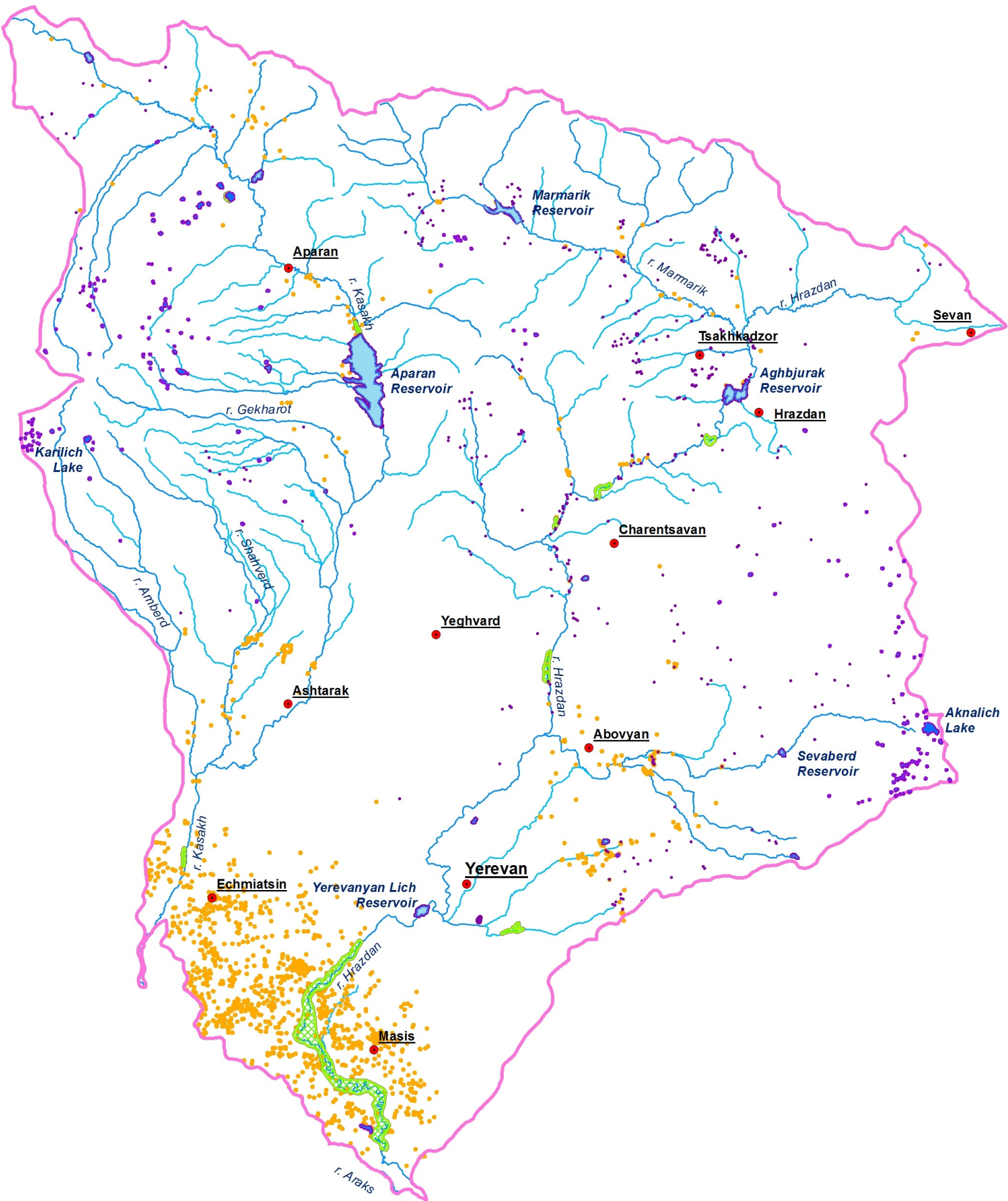
1 : 350 000

Activity implemented by Umweltbundesamt,
Austria & international Office for Water, France

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA



Ecotone Areas, Water Ecosystem Sanitary and Groundwater Resources Protection Zones of Hrazdan RBD



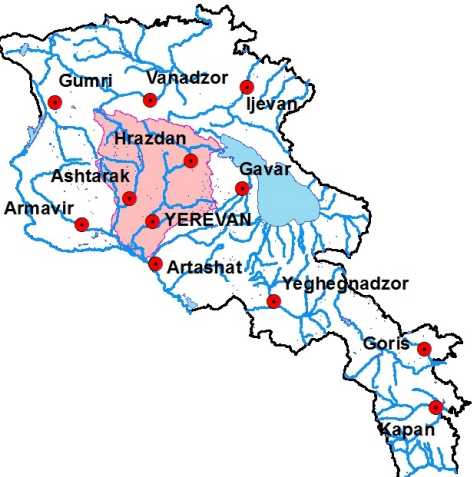
Thematic symbology

- Water Ecosystem Sanitary Protection Zones
- Ecotone Zones
- Groundwater Resources Protection Zones

Background layer legend

- Towns Main
- Reservoirs
- Lakes
- Ecotone
- Rivers
- Hrazdan Basin

Location Map



Systeme Coordination Reference

WGS 84

Scale

1 : 350 000

Data source

Hydromet, "Environmental Monitoring and Information Center", Hrazdan BMO



"European Union Water Initiative plus for Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

10.10.2019

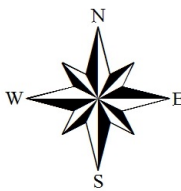
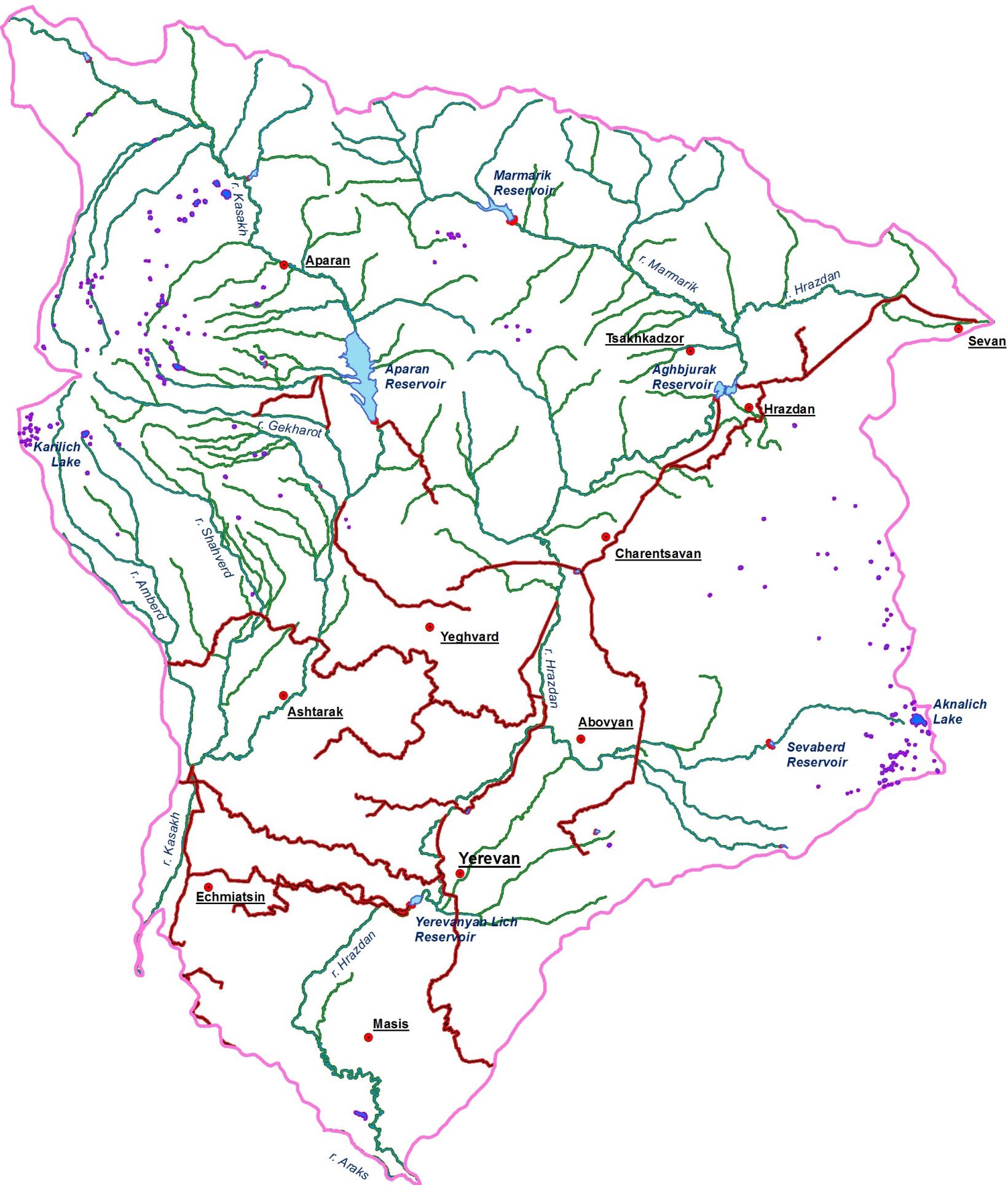
Path

1 : 350 000

Activity implemented by Umweltbundesamt, Austria & international Office for Water, France



Water Protection and Inalienable Zones of Hrazdan RBD



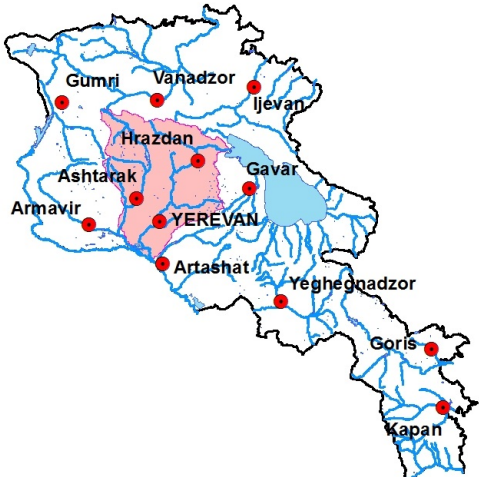
Thematic symbology

- Inalienable Zones
- Water Protection Zones

Background layer legend

- Towns Main
- Canals
- Reservoirs
- Rivers
- Lakes
- Hrazdan Basin

Location Map



Systeme Coordination Reference

WGS 84

Scale

1 : 350 000

Data source

Hydromet, "Environmental Monitoring and Information Center", Hrazdan BMO



"European Union Water Initiative plus for Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

10.10.2019

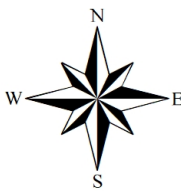
Path

1 : 350 000

Activity implemented by Umweltbundesamt, Austria & international Office for Water, France



Aglomerations and Proposed Location of New Wastewater Treatment Plants of Hrazdan RBD



- Agloreations**
- 1 Sevan
 - 2 Hrazdan
 - 3 Charentsavan
 - 4 Yerevan
 - 5 Masis
 - 6 Vagharshapat
 - 7 Ashtarak
 - 8 Aparan

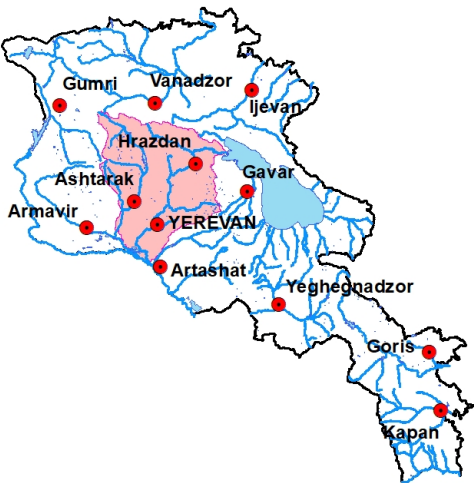
Thematic symbology

- Wastewater treatment plants
- Sewage Pipelines
- Agglomerations
- Settlements

Background layer legend

- Towns Main
- Reservoirs
- Lakes
- Rivers
- Hrazdan Basin

Location Map



Systeme Coordination Reference

WGS 84

Scale

1 : 350 000

Data source

Water State Commettii



"European Union Water Initiative plus for Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

05.03.2020

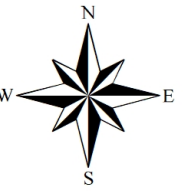
Path

1 : 350 000

Activity implemented by Umweltbundesamt, Austria & international Office for Water, France



Communities outside of the defined agglomerations
with more than 500 p.e. population in Hrazdan RBD



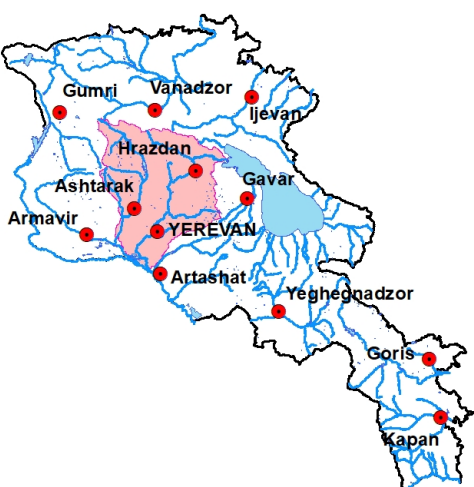
Thematic symbology

- Wastewater treatment plants
- Settlements

Background layer legend

- Towns Main
- Reservoirs
- Lakes
- Rivers
- Hrazdan Basin

Location Map



Systeme Coordination
Reference

WGS 84

Scale

1 : 350 000

Data source

Water State Commettii



"European Union Water Initiative plus for
Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

05.03.2020

Path

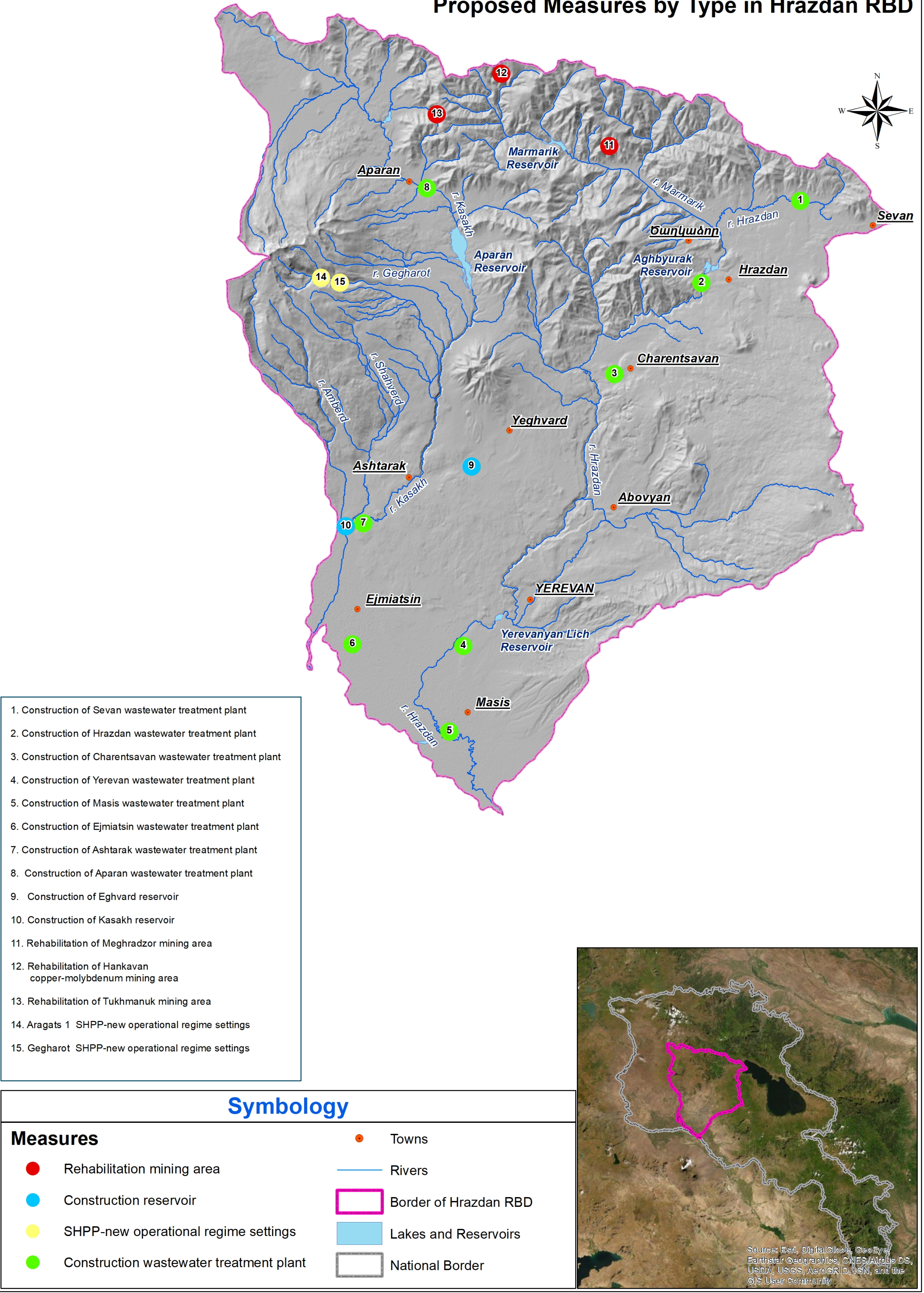
1 : 350 000

Activity implemented by Umweltbundesamt,
Austria & international Office for Water, France

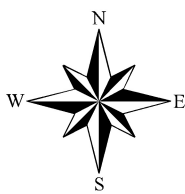
umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA



Proposed Measures by Type in Hrazdan RBD



Recommended monitoring sites of the Hrazdan RBD



Surveillance monitoring sites

- | N | Sampling site |
|---|--|
| 1 | Kasakh River mouth |
| 2 | Gegharot River mouth |
| 3 | Hrazdan River mouth |
| 4 | Marmarik 0.5 km above Hankavan village |
| 5 | Marmarik River mouth |
| 6 | Hrazdan below Hrazdan TPP |
| 7 | Aparan Res. |
| 8 | Yerevan Lake Res. |

Operational monitoring sites

- | N | Sampling site |
|----|---|
| 1 | Kasakh 0.5 km below the city Aparan |
| 2 | Kasakh 1 km above the city Ashtarak |
| 3 | Gegharot 0.5 km above the village Aragats |
| 4 | Hrazdan 0.5 km below the Arzni HPS |
| 5 | Hrazdan 9 km below the city Yerevan, near the village Darbnik |
| 6 | Getar River mouth |
| 7 | Meghradzor 0.1 km above the river mouth |
| 8 | Marmarik Aghavnadzor |
| 9 | Tsaghkadzor 0.85 km above the river mouth |
| 10 | Hrazdan Getamej |
| 11 | Akunq Mayakovsky |
| 12 | Hrazdan Yerevan Davitashen Bridge |
| 13 | Hrazdan Yerevan 0.2 km above of the Yerevanyan reservoir |
| 14 | Jrvezh Vardashen |
| 15 | Hrazdan Hovtashen |
| 16 | Halavar Melikgyugh |
| 17 | Amberd Oshakan |

Thematic symbology

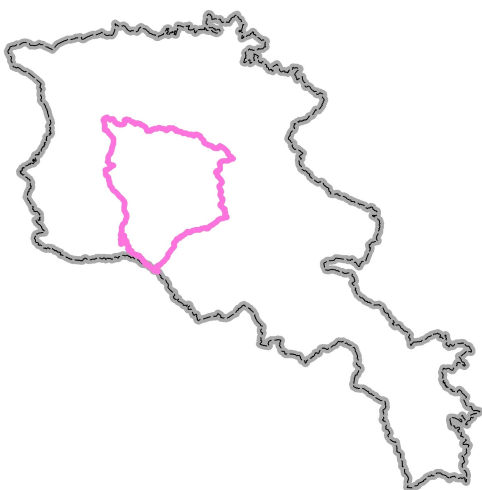
Surveillance monitoring sites Operational monitoring sites

- | | | | |
|--|------------------|--|--------|
| | Lakes/Reservoirs | | Rivers |
| | Rivers | | |

Background layer legend

- | | | | |
|--|-------------------|--|-----------------------|
| | Towns Main | | Rivers |
| | Lakes, Reservoirs | | Border of Hrazdan RBD |

Location Map



Systeme Cordination
Reference

WGS 84

Scale

1 : 350 000

Data source

Hydromet, "Environmental Monitoring and Information Center",
Hrazdan BMO



"European Union Water Initiative plus for
Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

10.12.2020

Path

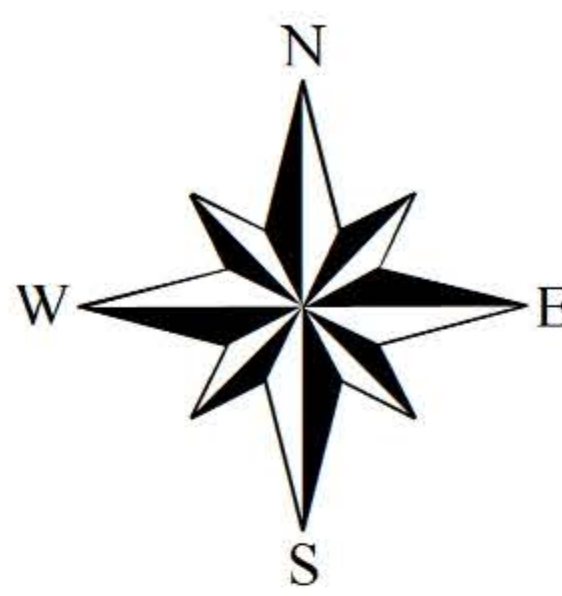
1 : 350 000

Activity implemented by Umweltbundesamt,
Austria & international Office for Water, France

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA



Groundwater bodies potentially at risk of Hrazdan RBD



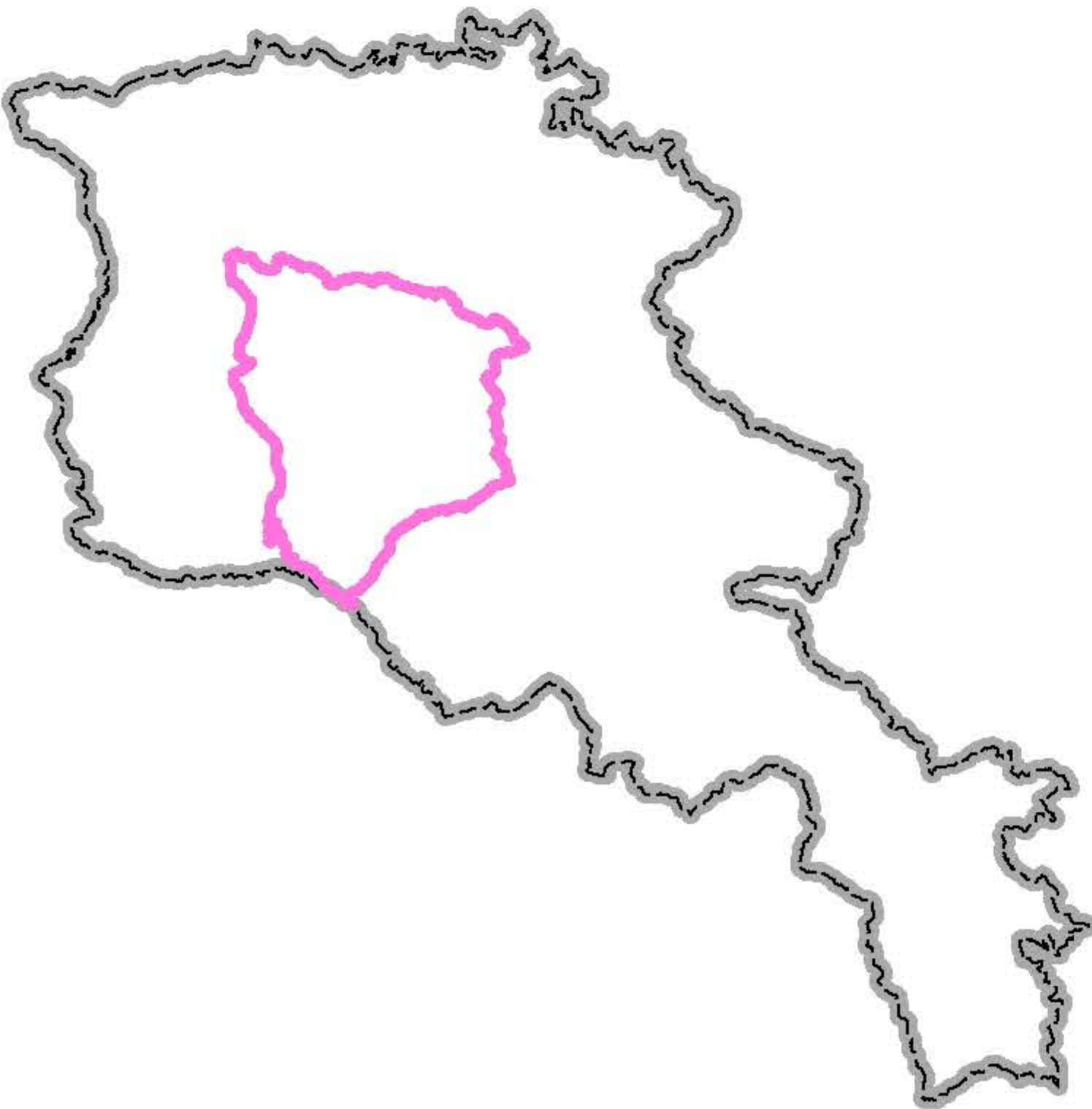
Thematic symbology

- Groudwater Bodies (GWB)
- Groundwater bodies potentially at risk (GWBPR)

Background layer legend

- Towns Main
- Lakes, Reservoirs
- Rivers
- Border of Hrazdan RBD

Location Map



Systeme Cordination
Reference

WGS 84

Scale

1 : 350 000

Data source

Hydromet, "Environmental Monitoring and Information Center",
Hrazdan BMO



"European Union Water Initiative plus for
Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

10.12.2020

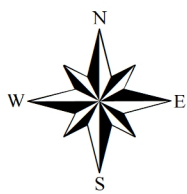
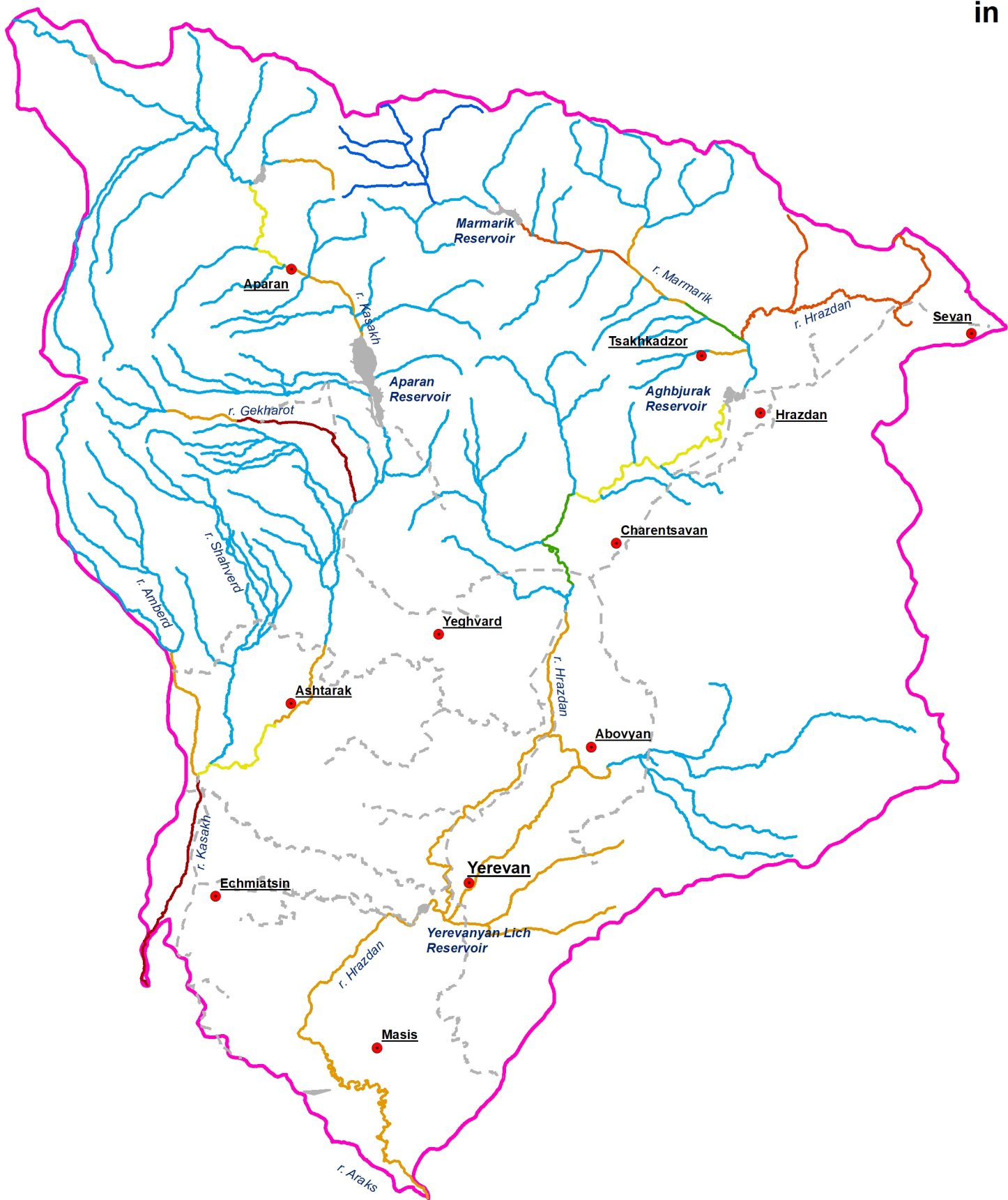
Path

1 : 350 000

Activity implemented by Umweltbundesamt,
Austria & international Office for Water, France



Ecological classification of SWB
in the Hrazdan RBD



Thematic symbology

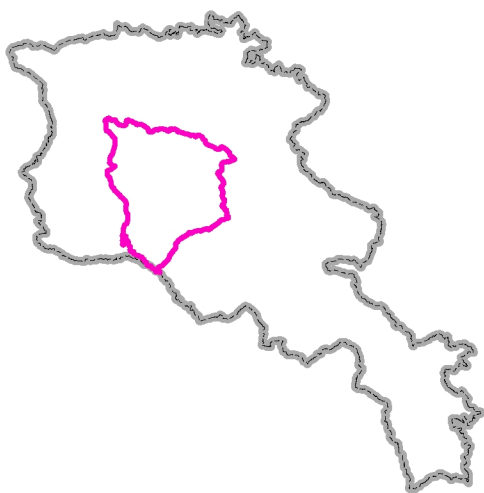
Ecological status

Lakes	Rivers	Status	Lakes	Rivers	Status
		High			Poor
		High-good			Bad
		Good			No data
		Moderate			Artificial
		Moderate-bad			

Background layer legend

- Towns Main
- Border of Hrazdan RBD

Location Map



Systeme Coordination
Reference

WGS 84

Scale

1 : 375 000

Data source

Hydromet, "Environmental Monitoring and Information Center",
Hrazdan BMO



"European Union Water Initiative plus for
Eastern Partnership Countries"



Institute of Chemical Physics NAS RA

Elaboration, revision, approval

10.12.2020

Path

1 : 350 000

Activity implemented by Umweltbundesamt,
Austria & international Office for Water, France





Action funded by the
EUROPEAN UNION



UNECE



OECD
BETTER POLICIES FOR BETTER LIVES

umweltbundesamt^U
ENVIRONMENT AGENCY AUSTRIA



OiEau
International Office
for Water

www.euwipluseast.eu