REPUBLIKA SLOVENIJA
MINISTRSTVO ZA OKOLJE IN PROSTOR
AGENCIJA REPUBLIKE SLOVENIJE ZA OKOLJE

HIDROLOŠKI LETOPIS SLOVENIJE 2001

THE 2001 HYDROLOGICAL YEARBOOK OF SLOVENIA

AGENCIJA REPUBLIKE SLOVENIJE ZA OKOLJE

NASLOVNICA – COVER PAGE

Ob koncu avgusta so se pretoki rek v Pomurju približali najmanjšim obdobnim vrednostim. Ob hidrometrični meritvi je imela Ščavnica na vodomerni postaji Pristava pretok 0,165 m^3/s (foto: Peter Frantar, 31. avgust 2001).

At the end of August discharges of the rivers in Pomurje region approached the lowest values of multiannual period. At hydrometrical measurement the discharge of the Ščavnica River at Pristava gauging station was 0,165 m^3/s (photo: Peter Frantar, August 31, 2001).

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GENERALNI DIREKTOR AGENCIJE – DIRECTOR GENERAL
dr. Silvo Žlebir

GLAVNI UREDNIK – EDITOR
mag. Jože Uhan

TEHNIČNI UREDNIKI – TECHNICAL EDITORS
mag. Marjan Bat, Peter Frantar, Jure Jerovšek, mag. Zlatko Mikulič, Vesna Ožura

KARTOGRAFIJA – CARTOGRAPHY
Peter Frantar

AVTORJI BESEDILA – MAIN AUTHORS
mag. Marjan Bat, mag. Mira Kobold, mag. Zlatko Mikulič, Janez Polajnar, Igor Strojan, Niko Trišić, mag. Florjana Ulaga

SODELAVCI – CONTRIBUTORS
dr. Mišo Andjelov, mag. Marjan Bat, Dušan Berglez, Vincenc Bogataj, Marko Burger, Peter Centrih, Peter Frantar, Primož Gajser, Gvido Galič, Tomaž Haller, Vida Herle, Jure Jerovšek, Slavica Jurković, mag. Mira Kobold, Bogdan Lalić, Roman Lesica, Jana Meljo, Mirko Mesec, Jože Miklavčič, mag. Zlatko Mikulič, Vesna Ožura, Radovan Pavičević, Janez Polajnar, Viktor Pongrac, Marjana Režek Ćućić, Mojca Robič, Damjan Rogelj, Vlado Savić, Rodoljub Simeunović, Nives Stele, Branko Stibilj, Igor Strojan, Kay Sušelj, Mojca Sušnik, Janez Šink, Bogomir Štolcar, Anica Šušteršič, Mihael Tominc, mag. Roman Trček, Niko Trišić, mag. Jože Uhan, mag. Florjana Ulaga, Barbara Vodenik

PREVOD – TRANSLATION
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LEKTORICA SLOVENSKEGA BESEDILA – PROOF READING OF SLOVENIAN TEXT
Miriam Stanonik

LEKTORICA ANGLEŠKEGA BESEDILA – PROOF READING OF ENGLISH TEXT
Barbara Jeram

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PREDGOVOR

Po podatkih Svetovne meteorološke organizacije (WMO) je bilo leto 2001 za letom 1998 najtoplejše v obdobju sistematskih meritev temperature zraka. Globalna temperatura zraka je že 23 let zaporedoma presegla povprečje obdobja 1961–1990.

Tudi v Sloveniji je bilo leto 2001 nadpovprečno vroče. Temperatura vode v rekah in jezerih je bila višja od povprečja. Celoletna količina padavin je bila v Sloveniji manjša od dolgoletnega povprečja. Reke so poplavljale v manjšem obsegu, večinoma le na območjih vsakoletnih poplav. Pretoki slovenskih rek so bili v splošnem za več kot deset odstotkov manjši od povprečja. Obdobje neprekinjenega trajanja malih pretokov je bilo v letu 2001 daljše kot leto pred tem. Hidrološka suša je bila v poletnih mesecih leta 2001 izrazita, vendar v obdobju izvajanja meritev ni bila ekstremna.

Poletje 2001 so zaznamovale tudi izrazito nizke gladine podzemnih voda v večini opazovanih vodonosnikov. Gladine podzemnih voda so bile v splošnem pod povprečnimi vrednostmi primerjalnega obdobja. V vročem in suhem poletju je hidrološka suša podzemnih voda zajela pretežni del aluvialnih vodonosnikov po državi. V pozni jeseni so se gladine podzemnih voda še zniževale in so ponekod dosegle rekordno nizko raven. Na več merilnih mestih v severovzhodni Sloveniji so bile zabeležene gladine pod najnižjo ravnijo zadnjih petdesetih let.

Vremenski pogoji v vegetacijskem obdobju leta 2001 so bili tudi za kmetijske rastline že drugo sezono zelo neugodni. Po ocenah agrometeorologov je bila to sedma najbolj izrazita kmetijska suša v zadnjih 41-ih letih.

Marsikje so vodni viri presahnili in potrebne so bile intervencije v preskrbi prebivalstva s pitno vodo. Prebivalcem, ki so bili predvsem zaradi suše slabše oskrbovani s pitno vodo iz javnih, lokalnih ali zasebnih vodovodnih omrežij, so po podatkih Uprave RS za zaščito in reševanje prepeljali več kot 65.000 kubičnih metrov pitne vode. Zaradi težav pri oskrbi s pitno vodo je bilo v letu 2001 prizadetih preko 31.000 ljudi.

Kakovost vode (tudi pitne) se je v obdobju hidrološke suše močno poslabšala. Nizke gladine, majhni pretoki in visoke temperature vode

FOREWORD

According to the World Meteorological Organisation (WMO), 2001 was in the period of systematic measurement of air temperature the hottest year after 1998. The global air temperature has exceeded the average temperature in the period of 1961-1990 for the past 23 years in succession.

Slovenia had a very hot 2001 as well. The water temperature in rivers and lakes was higher than average. The annual rainfall in Slovenia was lower than the multiannual mean. The rivers flooded at a smaller rate, mainly in the areas of yearly floods. The discharges of Slovene rivers were generally 10% lower than average. The period of constant low discharges was longer in 2001 than in the year before. The hydrological drought was especially severe in the summer months of 2001, but it did not reach extreme limits during measurements.

The summer of 2001 was marked by exceptionally low levels of groundwaters in most of the monitored aquifers. The levels of groundwaters were generally below the mean values of the comparative period. The hot and dry summer was the reason the hydrological drought of groundwaters seized most of the alluvial aquifers across Slovenia. The levels of groundwaters continued to lower in late autumn and reached a record low level. Several gauging stations in the north-east of Slovenia registered levels of water below the lowest level in the past fifty years.

The 2001 vegetation period was the second season of extremely unfavourable weather conditions for crops. According to agrometeorologists this was the seventh most distinctive agricultural drought in the past 41 years.

Water sources have run dry at many places and interventions regarding the drinking water supply for the general population were necessary. The inhabitants that were poorly supplied with drinking water from public, local or private water supply network due to the drought were given more than 65,000 ccm of drinking water according to the Administration for Civil Protection and Disaster Relief. Due to the problems connected with the drinking water supply, more than 31,000 people were affected in the year 2001.

so marsikje ogrozili ekosisteme in vplivali na zdravje ljudi. Pomen vode za zdravje pa je bil ob svetovnem dnevu vode leta 2001 tudi glavni poudarek v poslanici generalnega sekretarja Svetovne meteorološke organizacije, kjer ocenjujejo, da zaradi okužb, povezanih z vodo, vsak dan na svetu umre okoli 25 tisoč ljudi.

Na institucionalno organizacijskem področju nacionalne hidrološke dejavnosti v Sloveniji je bilo prvo leto novega tisočletja v znamenju uveljavljanja novih zakonskih določil o spremembah in dopolnitvah zakona o organizaciji in delovnih področjih ministrstev. Z omenjenim zakonom je bila ustanovljena Agencija Republike Slovenije za okolje, z vizijo, da postane učinkovita in strokovno neodvisna nacionalna okoljska institucija, ki deluje na širšem področju spremljanja stanja naravnih pojavov in onesnaženosti okolja ter izvajanja upravnih in drugih okoljskih nalog. Agencija Republike Slovenije za okolje naj bi združevala okoljevarstveni strokovni potencial, potreben v iskanju poglobljenih, strokovnih in usklajenih rešitev, ki jih prinaša medsebojno prepletena in tehnološko usmerjena globalna družba.

mag. Jože Uhan,
vodja sektorja za hidrologijo

The quality of water (drinking water as well) worsened substantially in the period of hydrological drought. Low water levels, low discharges and high temperature of water endangered ecosystems in many places and influenced the health of people. The importance of water for health was stressed in the official letter of the Secretary General of the World Meteorological Organisation on the World Water Day in 2001. They estimate that 25,000 people die every day due to infections, connected with water.

The first year of the new millennium in the field of institutional organisation of the national hydrological activity in Slovenia was marked by establishing new legislative provisions on changes and supplements of the law regarding the organisation and field of work of the ministries. The Environmental Agency of the Republic of Slovenia was established with a goal to become an effective and professionally independent national environmental institution, whose field of work encompasses a wide area of natural phenomena and pollution monitoring as well as implementing administrative and other environmental tasks. The Environmental Agency of the Republic of Slovenia should take on professionals in the field of environmental protection, who are needed in search for deepened, professional and concerted solutions brought by a mutually intertwined and technologically oriented global society.

Jože Uhan, MSc
Head of Hydrology Section

SPREMEMBE V MREŽI MERILNIH MEST HIDROLOŠKEGA MONITORINGA V SLOVENIJI LETA 2001

Marjan Bat

V Hidrološkem letopisu Slovenije za leto 2001 objavljamo podatke 156-ih vodomernih postaj na površinskih vodah, 130-ih postaj za podzemne vode, vodomerne postaje na izviru Podroteja ter mareografske postaje Luška Kapitanija v Kopru.

V merilni mreži monitoringa površinskih voda je leta 2001 delovalo 168 vodomernih postaj – tri več kot leto poprej. Na novo so se pričela le opazovanja na vodomerni postaji Iška vas na Iški (šifra 5425). Na vodomerni postaji Log pod Mangartom, na kanalu Roje (šifra 8245), potekajo opazovanja že od leta 1991, vendar ni bila vključena v državni monitoring. Roja je zanimiva, ker po njej v Koritnico, in s tem v Jadransko povodje, priteka voda iz opuščenega rudnika svinca v Rablju (Cave del Predil, Italija), ki pripada povodju Črnega morja (Ziljica, Zilja, Drava). V tem primeru imamo torej opraviti s pretočitvijo (piraterijo), ki je posledica človeškega delovanja. Zaradi spremljanja dogajanja v povirju Koritnice, kjer se je konec leta 2000 sprožil drobirski tok, so bila ponovno vzpostavljena opazovanja na vodomerni postaji Log pod Mangartom na Koritnici (šifra 8230). Prva opazovanja so bila na tem mestu od leta 1956 do 1982, ko so bila prekinjena. Zaradi različnih vzrokov (vzporedna ali pomanjkljiva opazovanja, težave z merilnimi instrumenti) v letopisu nismo objavili podatkov dvanajstih vodomernih postaj mreže hidrološkega monitoringa.

Podrobneje lahko lokacije vodomernih postaj na površinskih vodah uporabniki pregledujejo s pomočjo Atlasa okolja, ki ga najdejo na spletnih straneh Agencije Republike Slovenije za okolje (http://www.arso.gov.si/).

Na prerezih vodomernih postaj je bilo v letu 2001 opravljenih 1106 hidrometričnih meritev. Največji pretok, ki so ga uspele naše terenske skupine izmeriti v tem letu, je bil 344 m^3/s na Savi v Čatežu (15. februarja). Na Savinji v Velikem Širju so naši delavci merili ob pretoku

CHANGES IN THE NETWORK OF HYDROLOGICAL GAUGING STATIONS OF SLOVENIA IN THE YEAR 2001

Marjan Bat

The 2001 Hydrological Yearbook of Slovenia presents the data from 156 gauging stations, which were operating on surface watercourses, 130 stations operating on groundwaters, gauging station on the Podroteja spring and mareographic station at Luška Kapitanija in Koper.

There were 168 gauging stations operating in the monitoring system of surface waters in 2001 – three more than in the previous year. We added a new gauging station in Iška vas on the Iška River (code 5425). Observations on gauging station Log pod Magartom, the Roja canal (code 8245) have been taking place since 1991; however this station was not a part of national monitoring. The Roja is an interesting station, since water from abandoned lead mine in Rabelj (Cave del Predil, Italy), which belongs to the Black Sea catchment area (the Ziljica, Zilja, Drava rivers) runs through the Roja and then to the Koritnica River and finally to the Adriatic basin. In this case we are dealing with stream capture (stream piracy), which is the result of human intervention. Observations on gauging station Log pod Mangartom on the Koritnica River (code 8230) were re-established due to debris flow, which occurred in 2000, and therefore monitoring was necessary. First observations on the Koritnica River took place from 1956 until 1982, when they were terminated. The data from twelve gauging stations of hydrological monitoring system were not published in this yearbook due to various reasons (parallel or poor observations, troubles with measuring instruments).

The locations of gauging stations operating on surface waters can be examined in greater detail with the help of the Environment Atlas which can be found on the Environmental Agency of the Republic of Slovenia website (http://www.arso.gov.si/).

There were 1106 hydrometrical measurements performed in 2001 on gauging stations. The highest discharge our field team was able to

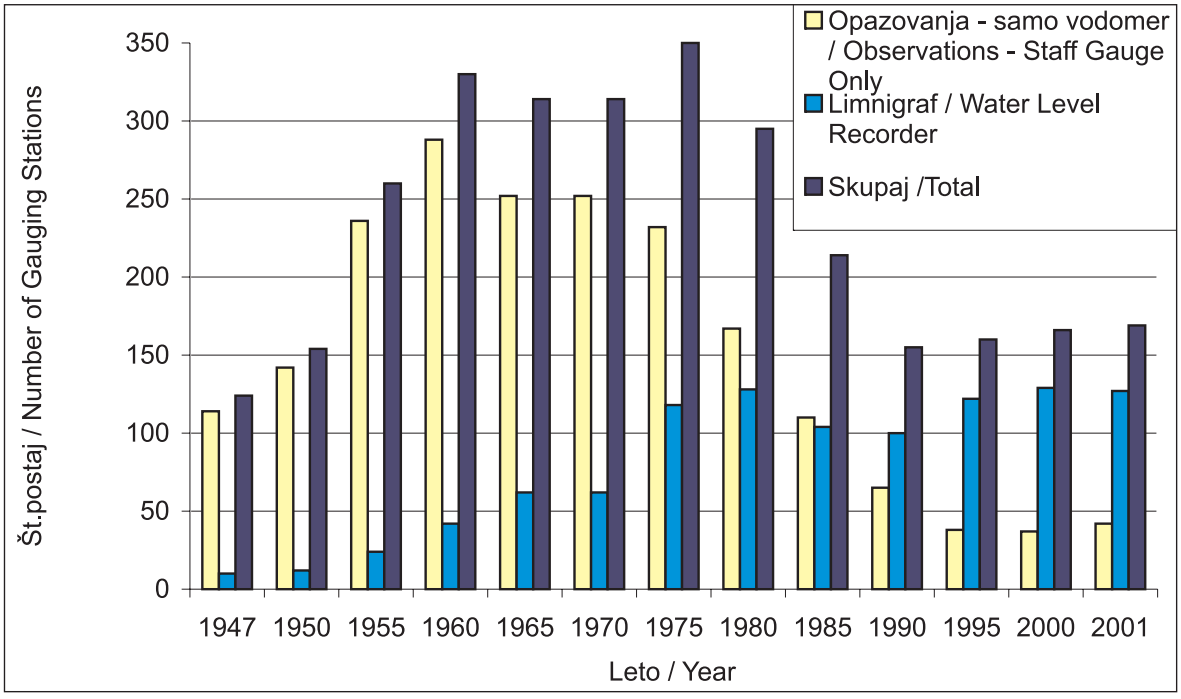
207 m³/s in srednji hitrosti toka, ki je presegla 1,6 m/s (14. marca). Tolikšen pretok je bil na Savinji v tem letu presežen le trikrat. Največja srednja hitrost toka (2,4 m/s) je bila ob hidrometrični meritvi na vodomerni postaji Bohinjska Bistrica na Bistrici.

Mreža hidrološkega monitoringa podzemnih voda je dobila dve novi postaji: v Mavčičah na Sorškem polju (VČ-1779 Mavčiče, šifra 80062) in Orli vasi ob Savinji (ČB-0283 Orla vas, šifra 35036; hidrogeološko pripada delu vodonosnika Spodnje Savinjske doline, ki ga poimenujemo po Bolski). V obeh primerih gre za piezometra, ki sta bila opremljena s podatkovnim zapisovalnikom. Po dve letni prekinitvi so se nadaljevale meritve tudi na postaji Polje pri Vodicah (šifra 75020). Opazovanja so bila prekinjena na postaji 0290 Vrtojba, šifra 95050, so pa leto poprej že stekla na novi lokaciji 0241 Vrtojba (šifra 95048). V tem letopisu se je, glede na leto poprej, število postaj, za katere objavljamo podatke, povečalo za dve. Na devetih postajah pa so bili vgrajeni podatkovni zapisovalniki, ki omogočajo neprekinjeno beleženje sprememb gladine podzemnih voda.

Hidrološki monitoring izvirov je tokrat predstavljen le s podatki kraškega izvira Podroteja. Delovanje sosednje postaje na Divjem jezeru je bilo začasno prekinjeno. Podatkovni zapi-

measure in 2001 was 344 m³/s on the Sava River near Čatež (February 15). Our team measured 207 m³/s discharge value on the Savinja River near Veliko Širje and mean flow speed, which exceeded 1.6 m/s (March 14). In 2001 this kind of discharge was exceeded only three times in the Savinja River. The highest mean flow speed (2.4 m/s) was registered on gauging station Bohinjska Bistrica near Bistrica.

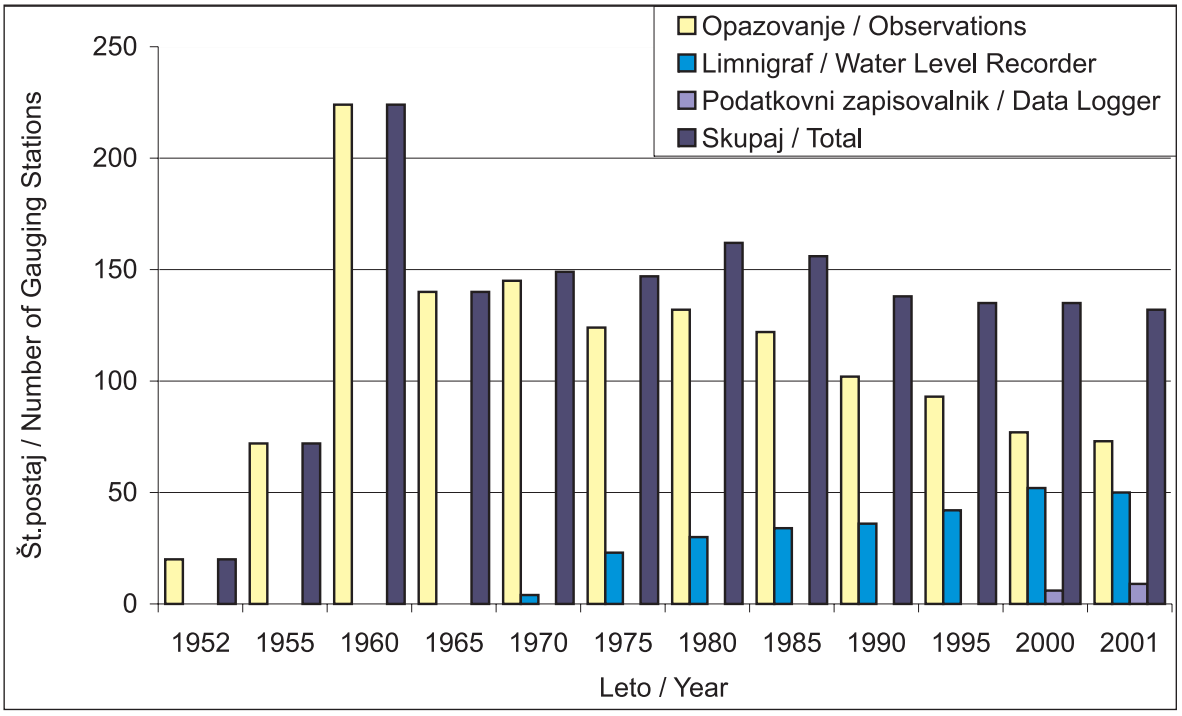
The network of hydrological gauging of groundwaters established two new stations: in Mavčiče on the Sora Plain (VČ-1779 Mavčiče, code 80062) and Orla vas near Savinja (ČB-0283 Orla vas, code 35036; hydrogeologically it belongs to a part of the Lower Savinja Valley aquifer, which is called after Bolska River). Both cases are concerned with two piezometers, equipped with data loggers. After two years of interruptions, the observations on gauging station Polje pri Vodicah (code 75020) resumed. The observations on station 0290 Vrtojba, code 95050 were terminated, but we have begun with observations on a new location (0241 Vrtojba, code 95048) a year before. The number of stations reported on in this yearbook has increased by two in comparison to the previous year. We have installed data loggers on nine stations. They enable uninterrupted registering of the groundwater level changes.



Graf 1: Število vodomernih postaj na površinskih vodah v obdobju od leta 1947 do 2001.
Graph 1: The number of gauging stations on surface waters in the period from 1947 till 2001.

sovalnik je januarja preplavila izjemno visoka voda. Analiza zbranih podatkov je pokazala, da je podatkovni zapisovalnik celo zabeležil konico visokega vala in šele potem prekinil zapisovanje. Po dveh letih opazovanj imamo v Divjem jezeru zabeleženo veliko razliko med najnižjo in najvišjo gladino (343 cm). Kljub skrbnemu proučevanju, ki je bilo opravljeno pred postavitvijo postaje, nas je visoka voda presenetila. Dogodek lepo ponazarja težave, s katerimi je povezana širitev mreže hidrološkega monitoringa izvirov. Njihova lega je običajno odročna, pretočni režimi pa slabo poznani, zelo spremenljivi in težko merljivi. To je zanesljivo eden od vzrokov, zaradi katerih so priprave na vzpostavitev rednega opazovanja na izvirih dolgotrajnejše. V letu 2001 so potekale takšne priprave še nadalje na izviru Pšate, Kamniške Bistrice in Globočca, pritoka Krke pri Fužinah.

This year, the hydrological monitoring of springs is presented with data from the karst spring Podroteja. The functioning of the neighbouring station at Divje jezero (Savage Lake) was temporarily terminated. The data logger was flooded with extremely high water in January. The analysis of the collected data has shown that the data logger even registered the peak of the high wave and only afterwards terminated the recording. After two years of observations at Divje jezero (Savage Lake) we have registered a great difference between the lowest and the highest level of the lake (343 cm). In spite of careful examination conducted before setting up the station high water took us by surprise. The latter event illustrates the troubles that are related to the expansion of the network of hydrological gauging stations . Their position is generally spatially remote, discharge regimes are not well known, are subject to changes and not easily measurable. This is without a doubt one of the reasons why the preparations for establishing regular observations on springs are rather time-consuming. In 2001, such preparations took place at Pšata and Kamniška Bistrica springs, as well as at spring of Globočec, tributary of the Krka River near Fužine.



Graf 2: Število vodomernih postaj na podzemnih vodah v obdobju od leta 1952 do 2001.
Graph 2: The number of gauging stations on groundwaters in the period from 1952 till 2001.