

# Sklep Conclusion

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Vodna bilanca obdobja 1971–2000 potrjuje, da ima Slovenija še vedno veliko vode. Trditev lahko podkrepimo tako, da hidrološke razmere pri nas primerjamo z evropskim in svetovnim povprečjem ali stanji v drugih državah (Kolbezen, 1986; Plut, 2000). Za tovrstne primerjave se uporabljajo običajno kazalci kot srednja letna količina padavin (padavine v mm), srednji letni odtok (povprečni letni odtok v  $\text{m}^3/\text{s}$ ) ali povprečni specifični odtok (izražen v  $\text{l/s/km}^2$ ). Te kazalce je smiselno upoštevati, saj z njimi ustvarimo bolj celosten pregled hidrološkega stanja območja. Pri oceni obremenitve vode kot naravnega vira, ali pri obravnavi vode kot vira za oskrbo prebivalstva, je smiselna primerjava letnega internega odtoka s številom prebivalcev.

Pri pregledovanju rezultatov vodne bilance in izvedenih kazalcev je treba upoštevati, da temeljijo na obdobjih letnih vrednostih. Elementi vodne bilance – padavine, izhlapevanje in odtok – so naravni pojavi, ki so od leta do leta zelo spremenljivi. Prav z obdobjimi vrednostmi se izognemo prevelikemu vplivu spremenljivosti. Pri vodni bilanci je še vrsta drugih vzrokov za uporabo obdobjnih vrednosti: snežni zadržek, spreminjanje vodnih zalog idr. Po drugi strani obdobjne vrednosti, ki veljajo za eno obdobje, niso namenjene ugotavljanju morebitnih tendenc v spreminjanju pojavov. Za Slovenijo imamo zaenkrat na voljo primerljive rezultate bilanc obdobj 1961–1990 in 1971–2000. Obdobji se prekrivata, zato je njuna primerjava smiselna le ob ustrezni strokovni kritičnosti, ne omogoča pa ugotavljanja tendenc. Ali pretoki v Sloveniji rastejo, upadajo, ali ostajajo na enaki ravni, je pomembna informacija. Zato smo v obdobjni vodni bilanci dodali poglavje o trendih pretokov. Analiza trenda je bila opravljena na vodomernih postajah z dolgim nizom podatkov in je zajela vse obdobje delovanja postaje do leta 2005. Poleg srednjih letnih pretokov (Qs) smo analizirali tudi letne male in velike pretoke ( $nQ_{np}$ ,  $nQ_{vk}$ ). Spremenljivost padavin in še

The 1971–2000 period water balance confirms that Slovenia still has a lot of water. The assertion can be supported by comparing the hydrological conditions in Slovenia with the European and global averages or with the situations in other countries (Kolbezen, 1986; Plut, 2000). These kinds of comparisons usually use indicators such as the mean annual quantity of precipitation (precipitation expressed in mm), the mean annual runoff (average annual runoff is expressed in  $\text{m}^3/\text{s}$ ) or the average specific runoff (expressed in  $\text{l/s/km}^2$ ). It is reasonable to use these indicators, as they help us generate a more complete and comprehensive overview of the hydrological status of an area. When assessing the pressures on water as a natural resource or when treating water as a source for supplying the population, it is reasonable to perform a comparison of the annual internal runoff with the number of citizens.

When reviewing the results of the water balance and the indicators derived from it, it should be taken into account that they are based on the longterm period annual values. The water balance elements of precipitation, evaporation and runoff are natural phenomena that vary significantly from year to year. With the longterm period values, we avoid too great an impact of the variation. There are numerous other reasons for using the longterm period values in the water balance, such as: snow residence time, variations in water storage, etc. On the other hand, the longterm period values that apply to one period are not intended for the establishment of potential tendencies in the variation of phenomena. For Slovenia, we currently have available comparable results of the water balances for the 1961–1990 and 1971–2000 periods. The periods overlap, which is why their comparison is reasonable if we are suitably and professionally critical, but it does not enable the establishment of tendencies. Whether the discharges in Slovenia are increasing, decreasing or



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Slika 76: Jezero

Figure 76:  
The Lake

nekaterih meteoroloških veličin, ki so za vodno bilanco prav tako pomembne, je že prikazana v drugih publikacijah (Cegnar, 2006). Analiza trendov nosi v sebi opozorilo, ki ga je potrebno dodati trditvi, da ima Slovenija vode zaenkrat še dovolj. Nakazujejo, da se količina vode tudi v Sloveniji zmanjšuje. Večina ugotovljenih sprememb se sklada z napovedanimi klimatskimi spremembami (pa naj jih jemljemo kot stvarnost ali znanstveno hipotezo). Trendi niso vedno statistično relevantni. Bolje pa je, da jih vzamemo kot resno opozorilo, kot da ob njih le zamahnemo z roko. Študije podnebnih sprememb namreč napovedujejo za območje Slovenije precejšnje zmanjševanje povprečne količine padavin in posledično vode v vodotokih (EEA, 2004).

Obdobje letne vrednosti ne razkrivajo sprememljivosti členov vodne bilance preko leta. Ta je nakazana v poglavjih o pretočnih režimih, podnebnju, padavinah in izhlapevanju. V teh poglavjih razberemo, da ima v povprečju Slovenija vode dovolj, v nekaterih mesecih pa lahko pride do pomanjkanja. Gre za sezonsko razporeditev. Najbolj velja ta grožnja za pozno poletje v jugozahodu in severovzhodu Slovenije, ko ob izostanku padavin in visokih temperaturah ob meteorološki in kmetijski suši nastopi tudi hidrološka suša. Nakazane spremembe padavinskega režima, trajanja snežne odeje, glede na nadmorsko višino, v povezavi s temperaturami zraka, se seštevajo in poudarjeno odražajo v pretočnih režimih. Ali bomo imeli spomladi in poleti, ko jo najbolj potrebujemo, vode vedno manj, jeseni, ko imamo že tako najbolj pogoste poplave, pa vedno več?

Slovenske pokrajine se glede na količino razpoložljive vode zelo razlikujejo. Razporeditev je s kartami letnih padavin, izhlapevanja, odtokov in specifičnih odtokov dobro prikazana. Pri specifičnih odtokih so razmerja med najbolj in najmanj vodnatimi porečji celo 1 : 10 in

remaining the same is an essential piece of information. Therefore we have added a chapter on the discharge trends in this longterm period's water balance. A trend analysis was performed on the water gauging stations using a long data set and this has captured the entire period of operation of the station up to 2005. In addition to the mean annual discharges ( $Q_s$ ), we also analysed the annual low and high discharges ( $nQ_{np}$ ,  $nQ_{vk}$ ). The variation in precipitation and in some other meteorological quantities that are important for the water balance is already shown in other publications. The trend analysis is carrying a warning that needs to be added to the assertion that Slovenia still has enough water. The trends indicate that the quantity of water is also decreasing in Slovenia. The majority of the changes established are in accordance with the forecast climate changes (whether understood as reality or a scientific hypothesis). The trends are not always statistically relevant, but it is better to understand them as a serious warning than just disregarding them. Climate change studies are forecasting a significant decrease in the average quantities of precipitation in the territory of Slovenia and, consequently, the decrease of water in the streams (EEA, 2004).

Longterm period annual values do not show variation in the water balance elements over the course of the year. This variation is indicated in the chapters on discharge regimes, the climate, precipitation and evaporation. It can be inferred from these chapters that Slovenia has enough water on average, though shortages can occur in some months. This involves the seasonal distribution. This threat is especially topical for late summer in the south-western and south-eastern parts of the country, when lack of rain and high temperatures during meteorological and farming droughts are also accompanied by hydrological drought. The indicated changes in the precipitation regime and the duration of the snow cover with respect to the elevation and in connection with air temperatures are totalled and are strongly reflected in the discharge regimes. Will we be having less water in the spring and summer when we need it most and increasingly more water in the autumn when we are already frequently experiencing floods?

Slovenian regions differ greatly in terms of the quantity of water available. The distribution is well-depicted in the charts of annual precipitation, evaporation, runoffs and specific runoffs. With specific runoffs, the ratios between the most and least water-abundant river basins can reach 1 : 10 or more. In general, these differences are one of the constants in the variation that goes on in Slovenia and we have adapted to them. Adaptation becomes more difficult and painful

več. V splošnem so te razlike ena od stalnic raznolikosti Slovenije in smo se jim prilagodili. Ob vedno večjih odklonih in spremembah postane prilagajanje vedno težavnejše in boleče. Med spremembami, ki so povezane z razpoložljivo vodo, omenimo pogostejše težave pri oskrbi s pitno vodo. Potrebe po njej najbolj zaskrbljujoče naraščajo v slovenskem Primorju, do občasnih motenj pa prihaja najbolj pogosto v subpanonskih gričevjih. Doslej smo jih še zadovoljivo reševali, če ne drugače z dovozom pitne vode, kar pa ni rešitev. Pritiskov, ki jih pomanjkanje vode povzroča ekološkimi sistemom, rastlinskimi in živalskimi združbam, z dovažanjem vode ne bomo ublažili.

Voda je pomembna naravna dobrina, ki je je zaenkrat v Sloveniji še v obilju. S podnebnimi spremembami se spreminja tudi to. Količine se zmanjšujejo, spreminja se časovna in geografska razporeditev vode. Žal prebivalci to občutimo šele ob sušah. In šele takrat, ko presahnejo tudi pipe, se večina zave, kaj nam in naravi pomeni imeti kvalitetno vodo v zadostnih količinah.

when the deviations increase. We should mention the frequent problems with supplying potable water among the changes linked to the available water. The need for water is increasing most worryingly in the coastal region, while occasional disruptions are occurring most frequently in the sub-Pannonian hills. Up to now, we have been able to resolve them adequately, then by transporting water to where it is needed if nothing else, though this does not represent a solution. We will not be able to mitigate the impacts of water shortage on ecosystems, plant and animal life by transporting water.

Water is an important natural commodity that is still in abundance in Slovenia for now. But even this is changing with climate change. The quantities are decreasing and the temporal and spatial distribution of water is changing. Unfortunately, the inhabitants only feel this during droughts. It is only when the taps run dry that the majority of people become aware of what having sufficient quantities of quality water means to us and to nature.



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Slika 77: Zelenci pozimi

Figure 77: Zelenci in the winter



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Slika 78: Škraplje na krasu / Figure 78: Karren on karst