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# Zagađenje voda i uzročnici

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# Opšte karakteristike vode



- toplotni kapacitet
- tačka ključanja i topljenja
- sposobnost rastvaranja
- gustina pri zagrijavanju i hlađenju
- površinski napon



Source	Percentage
Okeani	97,5%
Stojeća voda	2,5%
Polni i riječni	75%
Atmosfera i voda u biljkama i zemlji	1%
Nelotna podzemna voda	22%
Jezera	60,6%
Rijeke	0,4%

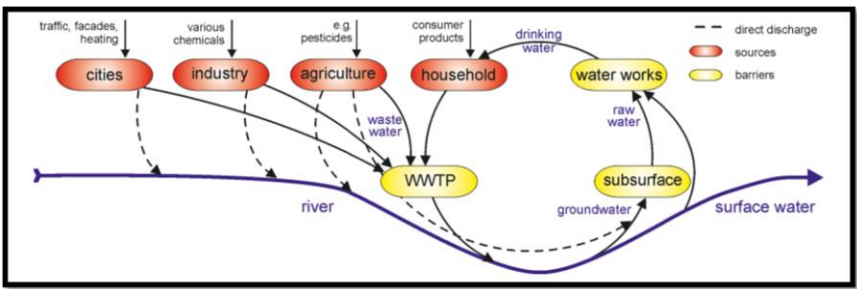
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## Zagađenje vode

- tačkasti i
- netačkasti (rasuti, difuzni) izvori



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## Otpadne vode

1. Domaće otpadne vode
2. Industrijske otpadne vode
3. Poljoprivredne otpadne vode
4. Gradske (komunalne) otpadne vode

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## Ciklus kruženja vode u prirodi i evolucija zagađenja



stijena      industrijski otpad  
smeće      vodonosni sloj  
polupropusni sloj      kisela kiša

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## Otpadne vode



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# Otpadne vode




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Vrste onečišćivala u otpadnim vodama	Štetne posljedice
<b>Krupni kruti materijal (tkanina, plastika, papir...)</b>	Neuredan krajolik (naslage otpada na obalama rijeka)
<b>Organske tvari (otpaci hrane, fekalne tvari...)</b>	Prisutnost bakterija: pomor riba i drugih vodenih organizama, neugodni mirisi
<b>Ulja i masti</b>	Na površini vode javlja se tanak nepropustan sloj – smanjena apsorpcija kisika iz atmosfere
<b>Nutrienti: azot, fosfor i tragovi štetnih tvari</b>	Potiču rast algi i morskih trava, cvjetanje algi
<b>Bakterije i virusi, uzročnici bolesti</b>	Onečišćenje voda koja se koriste za navodnjavanje poljoprivrede na kojima se uzgajaju kulture za prehranu; onečišćenje voda koje se koriste za uzgoj riba i školjki te onečišćenje voda koje se koriste za sport i rekreaciju- razvoj bolesti
<b>Toksične tvari (najčešće iz industrijskih otpadnih voda)</b>	Uništenje ili oštećenje vodene flore i faune

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## Teški metali u vodi


- esencijalne,
- neesencijalne i
- toksične.

GRUPA I			GRUPA II			GRUPA III	
Netoksični			Vrlo toksični i relativno podložni difuziji			Toksični, ali slabo topljivi ili vrlo rijetko	
Na	N	F	Be	As	Au	Ti	Ga
K	P	Li	Co	Se	Hg	Hf	La
Mg	Fe	Rb	Ni	Pd	Pb	Zr	Lu
Ca	S	Sr	Cu	Ag	Sb	W	Rh
H	Cl	Al	Zn	Cd	Bi	Nb	Ir
O	Br	Si	Sn	Pt	Cr	Ta	Ru
						Re	Ba

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## Izvori teških metala u vodi



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## Izvor teških metala u vodi

The diagram illustrates the sources and processes of heavy metals in water. Sources include **URBAN** (Waste Water Treatment), **INDUSTRIAL**, **MINING**, and **AGRICULTURAL** (Fertilization Erosion). In the water body, processes include **Biological and Chemical Transformation**, **Attachment and Release from Sediment**, **Settling and Resuspension**, and **Uptake by Organisms**. **Volatilization** is also shown. A legend indicates **Heavy Metals**.

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## Izvor teških metala u vodi

The diagram shows the atmospheric and water cycle pathways of heavy metals. **emisiija** (emission) from a factory leads to **plinovni-aerosol** (gas-aerosol) containing  $R_4Pb$ ,  $R_3Pb^+$ , and  $R_2Pb^{2+}$ . Processes include **isparavanje** (evaporation), **ispiranje** (washing), **suha depozicija** (dry deposition), and **ispiravanje** (rainout). **proizvodnja transport** (production transport) leads to **otp. vode** (wastewater) which enters **rijeke** (rivers) containing  $R_3Pb^+$  and  $R_2Pb^{2+}$ . **oborinske vode** (precipitation) and **padaline** (rain) also contribute. **bioakumulacija** (bioaccumulation) is shown in a fish.

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## Kamenac u vodi



ONEMOGUĆUJE  
TOPLOTNU  
IZMJENU  
(VEĆI  
TROŠKOVI)



ZAČEPLJIVANJE  
CIJEVI



SUHA KOŽA  
I KOSA



KORIŠTENJE  
TVRDE VODE  
UZROKUJE  
POVEĆANU  
POTROŠNJU  
DETERDŽENTA  
|  
ENERGIJE

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## Zašto je voda tvrda?

- BUDUĆI DA VIŠE OD 60 % VODE NA ZEMLJI PREDSTAVLJAJU PODZEMNE VODE, ONE PROLAZE KROZ STIJENE I TLA KUPEĆI USPUT MINERALE, UKLJUČUJUĆI KALJ I MAGNEZIJ.
- OVA DVA KONTAMINANTA PROIZVODE ONO ŠTO SE OBIČNO **NAZIVA "TVRDOĆA" VODE.**

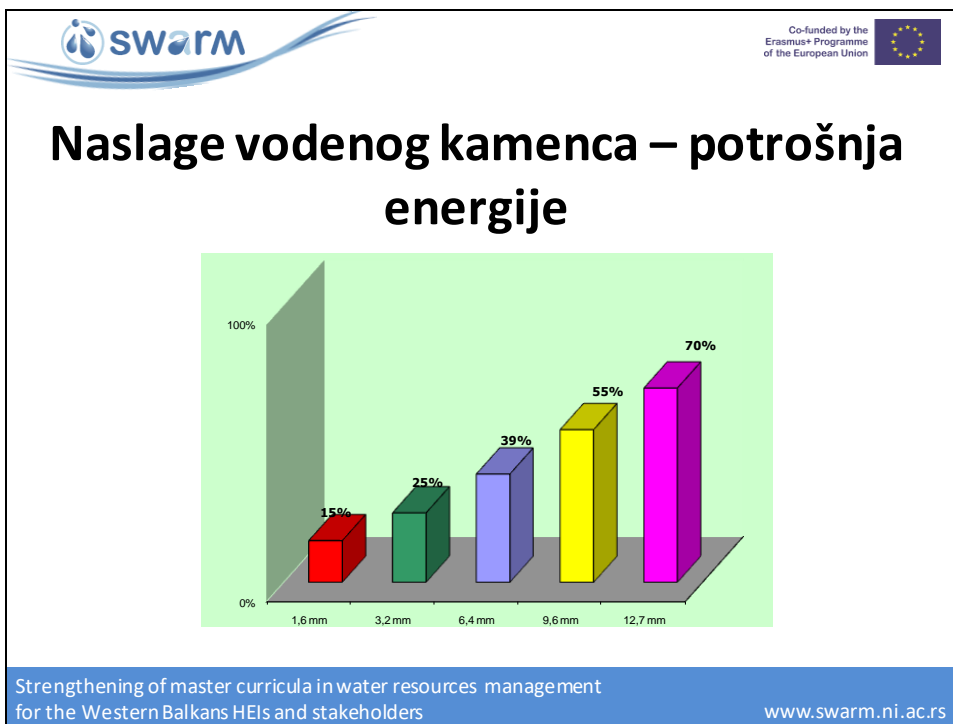
- 1.
- 2.

- Karbonatna tvrdoća
- Nekarbonatna tvrdoća



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