

**KAKOVOST POVRŠINSKIH VODA V VODNOGOSPODARSKIH
STROKOVNIH PODLAGAH ZA POTREBE USKLAJEVANJA
PROSTORSKEGA PLANIRANJA**
**SURFACE WATER QUALITY IN WATER MANAGEMENT STUDIES AND
PLANS TO BE USED IN THE HARMONIZATION PROCESS IN SPATIAL
DEVELOPMENT**

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Za potrebe usklajevanja prostorskega razvoja so ustrezno zasnovane in predstavljene vsebine strokovnih podlag najbolj učinkovit način vključevanja teh vsebin v postopek prostorskega usklajevanja. Poleg tega so primerno zasnovane vodnogospodarske strokovne podlage za potrebe prostorskega planiranja lahko učinkovit način uveljavljanja imisijskih meril varstva voda. Dosedanje strokovne podlage za pripravo prostorskega plana države teh vsebin niso najbolj ustrezno prikazale. Da bi to vsaj delno zagotovili, pripravljamo nove strokovne podlage za potrebe prostorskega plana RS, ki bodo predstavljene v dveh plasteh. Prva grafična plast bo prikazovala stanje sistema v prostoru, medtem ko bo druga prikazovala ciljno stanje, to je zeleno stanje, skozi prizmo potrebnih ukrepov za doseg ciljnega stanja. V prispevku je prikazan osnutek prikaza in vključitve vsebin kakovosti površinskih voda v pripravo prostorskega plana države

Ključne besede: kakovost vode, vodnogospodarstvo, varstvo kakovosti površinskih voda, prostorsko planiranje.

Properly planned and presented elements of water management studies and plans, to be used in the harmonization process in spatial planning, are the most efficient way of including these elements into the procedure of spatial harmonization. At the same time, properly planned water management studies and plans for the needs of spatial planning can also be an efficient way of introducing the immission criteria of water safety. Water management studies and plans for the preparation of the State Spatial Master Plan have, so far, not presented these elements in the most appropriate way. In order to bridge this situation at least partially, new water management studies and plans are being prepared to be used for the needs of the State Spatial Master Plan of the Republic of Slovenia. They will be presented in two layers. The first graphic layer will show the present situation of the system in the space, while the second graphic layer will show the conditions of use expressed through the necessary precautions for achieving long-term vision. The paper shows how the elements of surface water quality are presented and included in the preparation of the State Spatial Master Plan.

Key words: water quality, water management, surface water quality protection, spatial planning

1. PROBLEM

Dostikrat se premalo zavedamo, da so vode kot pomemben naraven vir, tudi odločujoč omejitveni oziroma razvojni dejavnik v prostoru. Teorija, da je voda naravni vir, je vključena v sisteme razvoja predvsem kot pojem "vodne količine ustrezne kakovosti". Teorija, da je voda precej več kot le "količina in dobra kakovost" in da je voda predvsem

1. PROBLEM

We are often not sufficiently aware that waters are as an important natural resource also a key restrictive or development factor in the space. The doctrine that water is a natural resource is included into the systems of development firstly as the concept "water quantities of adequate quality". The doctrine that water is much more than only "a quantity

ekološki dejavnik v spletu različnih združb rastlin in živali, se je v svetu uveljavila šele v zadnjih desetletjih. Tako pri kakovosti površinske vode ne moremo govoriti več samo o "za rabo primerni kakovosti," temveč predvsem o takšni kakovosti vode, ki z vidika zaščite vodnih in kopenskih ekosistemov (kamor sodi tudi človek) zagotovi trajnostni razvoj, torej zadostne količine vode, zadovoljivo kakovost vode ter primerno morfologijo vodotokov, kar je eno ključnih izhodišč, ki jih uokvirja nova evropska zakonodaja v "Direktivi o okvirni politiki na področju voda Evropske unije (COM(97)614 proposed Water Policy Framework Directive - WFD)." Torej, ko govorimo o kakovosti vode v ekološkem kontekstu, moramo upoštevati tudi količino, ki je v neposrednem sorazmerju s kakovostjo vode, oba pa sta pomembna razvojna dejavnika predvsem v času nizkih vodostajev. Prav tako moramo upoštevati morfologijo vodotoka, ki predstavlja enega ključnih dejavnikov življenjskega prostora rastlin in živali in tako neposredno vpliva na samočistilno sposobnost voda in raznovrstnost habitatov rastlinskih in živalskih vrst ter njihovih združb.

V veljavnem prostorskem planu RS (Ur. list SRS št.1/85, 41/87, 12/89; Ur. list RS št. 36/90, 11/99) je kakovost površinskih voda grafično podana na karti V.14: »Zasnova sanacije naravnih virov ter razmestitve čistilnih naprav«. Na karti so označene tri cone kakovostnega stanja voda (združeni kakovostni razredi I-IV., kot jih za svoje evidence uporablja Hidrometeorološki zavod). Kot obvezno izhodišče so označeni odseki vodotokov, kjer je predvidena sanacija onesnaženega vodotoka ter zasnova razmestitve čistilnih naprav. Kot neobvezno izhodišče pa so vrisani še ukrepi v industriji. Poleg vode karta obravnava tudi zrak in zasnovano sanacijo zraka. Tako zasnovan prikaz vsebin sicer podaja jasno sliko ukrepov predvsem za točkovno polucijo, želeli pa bi si bolj jasno zvezo med ukrepi, kakovostjo vode, načinom onesnaženja ter mestom onesnaženja in to ne le za točkovno onesnaževanje, temveč

and good quality," and that it is, in the first place, an ecological factor in the intertwine of various plant and animal communities, has gained importance in the world only in the last few years. Thus surface water quality is no longer restricted only to the meaning "quality appropriate for usage", but it is in the first place a matter of such water quality that, from the standpoint of protecting water and land ecosystems (that man is also part of), ensures sustainable development and thus sufficient quantity of water, satisfactory water quality and appropriate morphology of rivers. This is one of the key starting points set by the new European legislation in the "COM(97)614 proposed Water Policy Framework Directive - WFD." Thus, when speaking about water quality in the ecological context, one can no longer ignore the water quantity, which is in direct proportion to the water quality, and they are both important development factors, especially in the time of low water levels. Nor can one ignore the morphology of rivers, which presents one of the key factors of the living environment for plants and animals. In this way, it directly influences the self-purifying ability of waters and the diversity of habitats of plant and animal species and their communities.

In the current State Spatial Master Plan of the Republic of Slovenia (UL SRS No.1/85, 41/87, 12/89; US RS No. 36/90, 11/99) the quality of surface waters is presented graphically on map V.14: "The Concept of Sanitation of Natural Resources and Placement of Water Purifying Plants". The map shows three zones of water quality classes (combined quality classes I-IV, as used by the Hydrometeorological Institute for its records). The river sections, where the sanitation of the polluted river and the plan of placing water purifying plants are foreseen, are marked as obligatory tasks. Also the provisions in the industry are marked, but only as recommendations. Beside water, the same map also deals with air and the concept of air sanitation. Even though such a presentation of contents does give a clear picture of provisions, especially for the point pollution, we still desire a clearer connection between the necessary provisions, water quality, pollution type and the place of

tudi za razpršene vire (disperzno polucijo).

Pri zasnovi vodnogospodarskih strokovnih podlag za potrebe novega prostorskega plana RS smo zato izhajali iz temeljnega cilja: to je pripraviti takšne strokovne podlage, da bodo kar najbolj učinkovita strokovna podlaga za uveljavljanje imisijskih meril varstva voda, hkrati pa da bodo kar najbolj razvidne in bodo prikazale zvezo med stopnjo onesnaženosti, glavnimi onesnaževalci ter obstoječimi in predvidenimi ukrepi (Steinman & Vahtar, 1996; Vahtar et al., 1998).

2. CILJI USMERJANJA IN VAROVANJA

Slovenija v fazi približevanja EZ mora prilagoditi svojo zakonodajo zakonodaji EZ. Del tega procesa je tudi določitev evtrofikacijsko občutljivih con, to je con, ki so podvržene evtrofikaciji. Na padavinskih zbirnih območjih teh con bo morala biti izvedena III. stopnja čiščenja odpadnih voda, to je odstranjevanje dušika in fosforja. Del neuradnega dogovora je, da se kot evtrofikacijsko občutljivo območje šteje slovensko obalno morje, vsa naravna jezera in tista umetna jezera, ki se uporabljajo tudi za rekreacijo oz. vodopreskrbo. Od vodotokov so na evtrofikacijo občutljivi predvsem počasi tekoči in toplejši vodotoki (Krka, Kolpa, Sotla, Dragonja itd.). Nacionalni program varstva okolja (MOP-URSVN, 1998) pa na str. 37 kot evtrofikacijsko občutljiva območja podaja Kras, alpski svet, Pomurje ter območja s specifičnimi krajinskimi ureditvami in turističnim pomenom.

2.1. VODOTOKI IN JEZERA

Po določenih zakonodaje EZ, predvsem po novem okvirnem zakonu o vodah (Water Framework Directive WFD, ki je še vedno v postopku sprejemanja, vendar so znani delovni osnutki), bo treba v relativno kratkem času (10 do 20 let) zagotoviti ukrepe, da bodo vse površinske vode "dobre kakovosti", to je v I.

pollution, not only for point pollution, but also for diffuse pollution.

Our concept of water management studies and plans to be used in the new State Spatial Master Plan is therefore based on the basic goal: to prepare such studies and plans that will be as efficient as possible for asserting the immission criteria of water conservation, and at the same time easy to understand and clear in showing the connection between the level of pollution, the main pollutants and the existing and foreseen provisions (Steinman & Vahtar, 1996; Vahtar et al., 1998).

2. THE GOALS OF DIRECTION AND CONSERVATION

As Slovenia approaches the EU, it has to adapt its legislation to the EU legislation. A part of this process is also to define the eutrophication-sensitive zones, which are zones subjected to eutrophication. At the areas of precipitation accumulation of these zones the third level of purification of wastewaters will have to be built, i.e. the removal of nitrogen salts and phosphorus. Part of unofficial agreement is that the Slovenian Sea is considered a eutrophication-sensitive area, as well as all natural lakes and those artificial lakes which are used also for recreation or water supply. To eutrophication-sensitive rivers belong especially rivers that are slow and warmer (Krka, Kolpa, Sotla, Dragonja, etc.). However, the National Program of Environmental Protection (MOP-URSVN, 1998) on page 37 defines as eutrophication-sensitive areas the Karst region, the Alpine region, Prekmurje and the areas with specific landscape characteristics and tourist importance.

2.1. RIVERS AND LAKES

According to the provisions of the EU legislation, and especially according to the new Water Framework Directive (WFD), which is still in the process of adoption (although the drafts are already known), it will be necessary in a relatively short time of 10-20 years to adopt such provisions that will ensure "good quality" of surface waters, i.e. first or

ali II. kakovostnem razredu na lestvici od I. – V. razreda (kot jo uvaja EZ).

Poleg tega WFD, kakor tudi nov slovenski Zakon o vodah (ZV), ki je v pripravi (trenutno 9. osnutek iz junija 1998) določata površinske vode deloma kot kopalne vode, t.j. primerne za kopanje. Definicija je še ohlapna (v obeh dokumentih), vendar so kopalne vode načeloma tiste, kjer se po navadi kopa večje število ljudi, ali vode, ki so tako ali tako primerne za kopanje (18 ali več °C vsaj 40 dni v letu), ali pa tam, kjer bi želeli, da se ljudje (organizirano) kopajo. V Sloveniji bomo torej morali določiti kopalne cone in poskrbeti, da bo voda na teh območjih primerna za kopanje, predvsem kar zadeva sanitarno ureditev. Za zagotovitev ustrezne sanitarne kakovosti površinskih voda pa bo predvsem treba poskrbeti za primerno čiščenje in dezinfekcijo komunalnih in industrijskih voda (točkovna polucija), primerno kmetijsko prakso (disperzna polucija), in ne nazadnje tudi za primerno vedenje kopalcev (postavitve in koriščenje urejenih sanitarij).

2.2 MORJE

Vse, kar smo napisali za površinske vodotoke in jezera, velja tudi za morje. Seveda morje ne bo kvalificirano kot vir pitne vode v smislu "dobre kakovosti", pač pa bo toliko več pozornosti posvečene ohranjanju oz. izboljšanju obstoječe raznolikosti avtohtonih vrst rib in drugih živalskih in rastlinskih vrst, ki prav tako potrebujejo vodo primerne kakovosti. Predvsem školjke oz. kar vsi filtratorji so namreč izredno občutljivi na nerazgradljivo nesnago v vodi, ki jo skozi prehrabno verigo akumulirajo in množijo v svojih tkivih (bioakumulacija in biomagnifikacija). Posebej bo treba upoštevati evtrofikacijske procese v slovenskem obalnem morju, Tržaškem zalivu in celotnem severnem Jadranu ter tako v čim večji meri vrniti nekdanjo kakovost.

Če povzamemo je temeljni cilj usmerjanja in varovanja, torej zeleno ciljno stanje voda na področju kakovosti površinskih voda, doseči,

second quality class in the scales of class I-V (as being introduced by the EU).

Further on, the WDF as well as the new Slovenian Water Act (WA) currently being prepared (valid at the moment draft 9 from June 1998) define surface waters partially as bathing waters, i.e. appropriate for bathing. The definition is still vague (in both documents), however bathing waters are in principle those waters where normally a large number of people bathes, or those waters that are appropriate for bathing anyway (18 or more °C, at least 40 days a year), or those areas where it is desired that people should bathe (organised bathing). For this reason, we will have to define the bathing zones in Slovenia and ensure that the water in these areas will be appropriate for bathing, especially in the sanitary respect. To ensure the adequate sanitary quality of surface waters, the sufficient purification and disinfecting of communal and industrial waters (point pollution), the appropriate agricultural practice (diffuse pollution), and last also the appropriate behaviour of bathers themselves (placement and usage of sanitary facilities) will have to be adopted.

2.2 SEA

Everything that was said above regarding surface rivers and lakes holds true also for the sea. Naturally, the sea can not be qualified as the source of drinking water in the sense of "good quality", but we will have to pay more attention to preserving or improving the existing diversity of autochthonous species of fish and other marine animal and plant species which also need a certain water quality. Especially clams and other filtrators can be extremely sensitive to non-degradable pollution in the water, because they accumulate it through their digestive systems and magnify it in their tissues (bioaccumulation and biomagnification). Therefore, it will be necessary to monitor the eutrophication processes in the Slovenian coastal sea and in the Gulf of Trieste, and, in a long run, to restore the good water quality of the Northern Adriatic.

In short, the long-term objective of surface

da bodo vse površinske vode do leta 2010 "dobre kakovosti". Da bi to dosegli, je treba v kontekstu prostorskega planiranja zagotoviti:

- varstvo vseh tistih delov vodotokov in drugih površinskih voda z njihovimi prispevnimi območji, ki so še relativno neobremenjeni pred potencialnim onesnaženjem;
- uveljavitev varstvenih režimov oziroma sanacijskih ukrepov na najbolj obremenjenih območjih površinskih voda s prispevnimi območji, pri čemer je pomembno, da se uveljavijo sanacijski ukrepi na vseh eutrofikacijskih območjih.

3. OSNUTEK VODNEGA SISTEMA V PROSTORSKEM PLANIRANJU

Vodni sistem je za potrebe prostorskega planiranja zasnovan tako, da upošteva dvojnost sistema in iz tega izhajajočo dvojno vlogo vodnega gospodarstva (Kompare et al., 1997).

V prvi vlogi gre za varovanje splošnega javnega interesa, torej za ekosistemski pristop, ki smo ga imenovali SISTEM OKOLJE. To vključuje ohranjanje zdravega vodnega okolja, izboljšanje kakovosti površinskih in podzemnih voda, ohranjanje in povečevanje samočistilne sposobnosti vode ter večjo biotsko raznovrstnost. Z drugimi besedami to pomeni, da vprašanje varovanja vode in vodnega okolja narekuje posameznim uporabnikom prostora, da pogojujejo in omejujejo njihovo rabo ali pa določeno vrsto rabe celo izločijo iz za to občutljivega prostora.

V drugi vlogi je vodno gospodarstvo predvsem v službi drugih sektorjev ali porabnikov vode. Gre za antropocentrični pristop, ki smo ga poimenovali SISTEM RABA, kjer vodno gospodarstvo skuša zadovoljiti človekove potrebe po zadostnih količinah, ustrezni kakovosti in drugih odlikah vode (npr. lega, potencial, glej. Kompare et al., 1997), vendar glede na trajnostni razvoj (sustainable development).

water quality, is to achieve that all surface waters will be of "good quality" by the year 2010. To achieve this, the following will have to be ensured in the context of spatial planning:

- protection from potential pollution of all those parts of rivers and other surface waters with their attributive areas which are still relatively clean;
- introduction of safety regimes or sanitation provisions to the most burdened areas of surface waters with their attributive areas, as well as introducing of sanitation provisions in all eutrophication areas.

3. CONCEPT OF WATER SYSTEM IN SPATIAL PLANING

Water system is for the needs of spatial planning designed in such a way that it considers the double nature of the system and the resulting double role of water management (Kompare et al., 1997).

The first role is the protection of general public interest, i.e. the ecosystem approach that we call SYSTEM-ENVIRONMENT. It includes the conservation of healthy aquatic environment, improvement of surface and underground water quality, conservation and improvement of the self-purifying ability of waters and larger biotic diversity. In other words, because of water protection and aquatic environment protection it is sometimes necessary to condition and limit the specific use of space or water, and sometimes even to eliminate certain types of use from the areas sensitive to this use.

In its second role water management is above all in the service of other sectors or users of water. This is an anthropocentric approach that we call SYSTEM-USE, where water management is trying to satisfy the needs of man for certain quantities, appropriate quality and other distinctive features of water (such as its position, potential, see Kompare et al., 1997), but in the sense of sustainable development.

4. OSNUTEK VARSTVA POVRŠINSKIH VODA

4.1. UKREPI ZA DOSEGO CILJNEGA STANJA

4.1.1. VODOTOKI IN JEZERA

Lokalne skupnosti in drugi industrijski onesnaževalci so že zaradi emisijskih predpisov obvezani čistiti odpadne vode pred izlivom v okolje oz. v vodotok. Država pa bi morala z uporabo imisijskega načela stimulirati in pospeševati reševanje najbolj nujnih primerov celotnega povodja, oz. takih, ki jih emisijsko načelo neustrezno oz. nezadostno pokrije – tipičen primer je kopičenje industrije na malem vodotoku, kjer vsi sicer čistijo odplake do predpisane emisijske stopnje, a je zaradi preobremenitve vodotok še vedno slabe kakovosti. Imisijski princip oz. okoljski princip (ambient quality) je uveden tudi v WFD in v predlog našega ZV. V zakonodaji EZ uveljavljen princip PPP (Pollutor Pays Principle = Princip onesnaževalec plača), ki se je tudi pri nas začel uveljavljati z Uredbami o taksah na onesnaženje (od leta 1996) v veliki meri odpravlja omenjeno težavo.

Po obstoječi direktivi EZ o čiščenju komunalnih voda (Urban Waste Water Treatment Directive, UWWTD) morajo vse države članice do leta 2005 (oz. z mogočo rahlo zakasnitvijo, če ekonomska računica tako pokaže) izgraditi “primerno” kanalizacijo in zagotoviti “primerno” čiščenje komunalnih in njim pripadajočih industrijskih voda. Tu pojem “primerno” pomeni izgradnjo kanalizacije v vseh naseljih z več kot 2 000 prebivalci, vsaj II. stopnjo čiščenja, oz. III. stopnjo čiščenja, če gre za eutrofikacijsko občutljivo območje. Slovenija se bo morala tej zakonodaji podrediti – ustrezne priprave z izračuni stroškov in opredelitvijo potrebnih virov in dinamike sredstev ravnokar potekajo na MOP-u. Tako bomo v Sloveniji ob spoštovanju UWWTD do neke mere selektivno sanirali obstoječe čistilne naprave,

4. CONCEPT OF SURFACE WATER PROTECTION

4.1. MEASURES TO ACHIEVE THE LONG-TERM VISION

4.1.1. RIVERS AND LAKES

The emission regulations demand of local communities and other industrial pollutants to clean wastewaters before they enter the environment or a river. The state should stimulate and encourage the solution of the most urgent cases of the whole river basin or such areas that are not sufficiently or inadequately protected by the emission principle. A typical example is the accumulation of industry on a small river, where all pollutants actually purify their wastewaters to the prescribed emission level, but the water is still of poor quality due to the overburdening of the river. The immission principle or the ambient quality principle has been introduced also to WFD and to the proposal of our WA. In the EU legislation the Pollutor Pays Principle (PPP) has already been introduced. The Regulations on Pollution Taxation (since 1996) have introduced this principle also in Slovenia and they rectify this problem to a large extent.

According to the existing EU Urban Waste Water Treatment Directive (UWWTD) all EU member countries have to build an "appropriate" sewage system and ensure "appropriate" purification of communal and related industrial waters by the year 2005 (or with a short delay because of the economic reasons). Here, the term "appropriate" denotes the construction of sewage systems in all settlements with more than 2,000 inhabitants, minimum purification level II, or III if it is a eutrophication-sensitive area. Slovenia will have to subject to this legislation - adequate preparations with the calculations of costs and the definition of the necessary resources with the dynamics of funds are currently going on at the Ministry for Environment and Space. In this way Slovenia will, respecting UWWTD, renovate the existing purifying plants to a certain extent and, in the same time, build

hkrati zgradili dodatne čistilne naprave, oboje pa dopolnili ali začasno nadomestili z alternativnimi metodami čiščenja. Disperzno polucijo s površinskim odtokom s kmetijskih površin bo mogoče zmanjšati tudi z uvajanjem rastlinskih zaščitnih pasov, močvirij in rastlinskih čistilnih naprav (RČN), predvsem pa z uvajanjem režimov ustrezne rabe prostora (dobra kmetijska praksa Best Agricultural Practice, BAP).

Čistilne naprave (ČN), posebno pa rastlinski sistemi čiščenja odpadnih voda (RČN), so veliki porabniki prostora. Za zagotovitev površin, potrebnih za izgradnjo in razvoj takšnih sistemov, ki bodo v prihodnosti vse bolj aktualni, je v občinskem prostorskem planu nujno potrebno zagotoviti ustrezne površine kot rezervate za razvoj čistilnih sistemov, pa tudi površine za dispozicijo blata. Hkrati bo v prihodnje potrebno selektivno zagotoviti načine pospeševanja graditve in optimalnega pogona čistilnih sistemov z različnimi ekonomskimi prijemi. Predvsem pa je pomembno zagotoviti primerno ozračje za dobro kmetijsko prakso z vsemi ukrepi za zmanjševanje disperzne polucije (vključno z graditvijo puferskih pasov, močvirij itd.).

Za območje kopalnih voda morajo gorvodne ČN vsaj v kopalni sezoni dezinficirati svoje iztoke. V kmetijstvu so tudi potrebni poostreni ukrepi, ki jih bo mogoče doseči le s svetovalno službo in zavedno uporabo dobre kmetijske prakse.

Če povzamemo, varstvo kakovosti površinskih voda najučinkoviteje zagotovimo:

- z **vgraditvijo politike varstva** kakovosti površinskih voda v **PP RS**;
- z **graditvijo čistilnih naprav**, za katere je z občinskim prostorskim planom treba zagotoviti ustrezne površine za same čistilne naprave in dispozicijo blata; (priključenost na čistilne naprave za vsa mesta z več kot 2 000 prebivalci (zahteva WFD) je kot obvezno izhodišče opredeljeno že v PP RS)
- z **novimi tehnološkimi rešitvami in ekonomskimi prijemi** za spodbujanje teh rešitev;

additional purifying plants. They will also be supplemented or temporarily replaced by alternative purifying methods. The diffuse pollution with surface outflow from agricultural surfaces can be reduced also by introducing protective vegetation buffer zones, swamps and vegetation purifying plants (VPP), and especially by introducing regimes of adequate spatial use (Best Agricultural Practice, BAP).

Purifying plants (PP), and especially the vegetation systems of purifying wastewaters (VPP) are large consumers of space. To ensure surfaces necessary for the construction and development of such systems, which will be increasingly important in the future, it is indispensable to ensure adequate surfaces in the local spatial plans, which would serve as reservations for the development of purifying systems and also as surfaces for the mud depositing. In the future, it will also be necessary to plan selectively the ways of accelerating the construction and optimal functioning of purifying systems by taking different economic measures. It is especially important to ensure adequate climate for best agricultural practice with all the measures to reduce diffuse pollution (including the construction of buffer zones, swamps, etc.).

For the areas of bathing waters the upstream PP need to disinfect their outflows at least in the bathing season. Agriculture too needs more rigid measures that can be achieved only with an advisory service and conscious use of best agricultural practice.

In short, the protection of surface water quality can be ensured in the most efficient way by:

- **introducing the policy of surface water quality in SSMP**;
- **constructing purifying plants**, for which local spatial plans have to ensure adequate space for purifying plants and for mud depositing; (the regulation of WFD that all towns with more than 2,000 inhabitants are to be connected to purifying plants is defined as obligatory base already in the SSMP);
- **new technological solutions and economic measures** for the stimulation of

- z **učinkovito predhodno analizo o možnem čiščenju industrijskih odpadkov**, kar bi morali **uveljavljati v postopku pridobitve** lokacijskega, gradbenega in **uporabnega dovoljenja** pri novogradnjah ter inšpekcijske službe z odvzemom uporabnega/obratovalnega dovoljenja pri neustreznih rešitvah oz. neprimernem, neustreznem obratovanju;
- z **zaščito pred disperznim onesnaževanjem** itd.

4.1.2. MORJE

Za zmanjšanje eutrofikacije je treba obvladati stanje na prispevnem območju, to je zmanjšati točkovno in disperzno polucijo, ter zagotoviti primerne režime odtoka površinskih voda (velika erozija ob nalivih!). Za zmanjšanje točkovne polucije bo tako, kot smo to napisali za vodotoke in jezera, tudi za morje treba zgraditi dodatne čistilne naprave v celotnem povodju in poskrbeti za sanacijo kanalizacijskega omrežja. Za to je treba:

- **politiko varstva** kakovosti morja **vgraditi v PP RS**;
- z občinskim prostorskim planom rezervirati površine za izgradnjo dodatnih čistilnih naprav;
- s **postopkom pridobivanja lokacijskih, gradbenih in uporabnih dovoljenj** ter z delovanjem inšpekcijskih služb **zagotavljati izvajanje predvidenih potrebnih ukrepov** oz. sanacije.
- **predvideti sredstva za sanacijo kanalizacijskega sistema** z ustreznimi finančnimi ukrepi;
- povezovanje s sosednjimi državami mora dolgoročno imeti za cilj tudi zmanjšani vpliv z morja;
- **ojačati monitoring**;
- zmanjšanje porabe vode;
- **vnovična uporaba vode**.

these solutions;

- **efficient advanced analysis of the possible purification of industrial wastes**, which should be **introduced in the process of acquiring** the site, building and **application permits** when starting new constructions, and authorized inspectors should withdraw the application permit in cases of inadequate solutions or inappropriate operation;
- **protection against diffuse pollution** etc.

4.1.2. SEA

In order to reduce eutrophication, the situation at the attributive area has to be controlled, which means that the point and diffuse pollution are to be reduced and the appropriate outflow regimes of surface waters are to be ensured (large erosion at heavy rains!). To reduce the point pollution in the sea, just as in rivers and lakes, new purifying plants will have to be built in the whole coastal region and the sewage network will have to be renovated. For this purpose the following is necessary:

- **the policy of sea quality protection is to be incorporated into SSMP**;
- local spatial plans should reserve space for the construction of additional purifying plants;
- with the **procedure of acquiring site, building and application permits** and with proper inspection the **execution of the foreseen necessary measures and provisions** or renovations will have to be ensured;
- **ensuring funds for the renovation of sewage systems** with adequate financial measures;
- connection with the neighbouring countries has to be based on the long-term vision of reducing the impacts from the sea;
- **strengthening the monitoring**;
- reduction of water consumption (**water recycling**).

4.2. METODOLOGIJA IZDELAVE KARTOGRAFSKEGA MATERIALA

S kartografskim prikazom vsebin želimo kar najbolj učinkovito prikazati zvezo med stopnjo onesnaženja, glavnimi onesnaževalci ter obstoječimi in predvidenimi ukrepi za izboljšanje stanja (slika 1, preglednica 1). Zato smo karte prikazali v dveh vsebinskih plasteh: karte stanja s podrobnim opisom vseh dejavnikov, ki vplivajo na kakovost površinskih voda in karte ukrepov, kjer je skozi prizmo ukrepov prikazano zeleno stanje, to je stanje, kot ga določajo politika varstva voda, mednarodni sporazumi in podobno.

Za prikaz kakovostnega stanja vodotokov smo izbrali uveljavljen način z barvami, kot je bil prikazan v starem prostorskem planu (Ur.l. SRS 1/85) in kot ga uporablja Hidrometeorološki zavod (kakovostni razredi: modra = I. razred, zelena = II. razred, rumena = III. razred, rdeča = IV. razred), saj podatkov o kakovosti vode, opredeljene s petimi razredi (kot jo uvaja EZ) še ni na voljo. Nadalje smo kot pomemben podatek upoštevali obremenjenost vodotokov s točkovnim in z razpršenim onesnaženjem. Glavne izvore točkovnega onesnaženja smo ponazorili s pravokotnim krožnim segmentom, kjer vrh segmenta kaže na mesto vzorčevanja oziroma na izpust odpadne vode, sam segment pa je razdeljen na podsegmente, ki kažejo na vrsto onesnaženja in delež čiščenja (slika 2a). Razpršeno onesnaževanje smo prikazali kot onesnaževanje zaradi urbanizacije in intenzivne kmetijske proizvodnje (slika 2b). Poleg tega smo prikazali še območja, ki so urejena s kanalizacijo, lokacije obstoječih ČN (zmogljivost in obremenjenost) ter označili lokacije obstoječih komunalnih odlagališč.

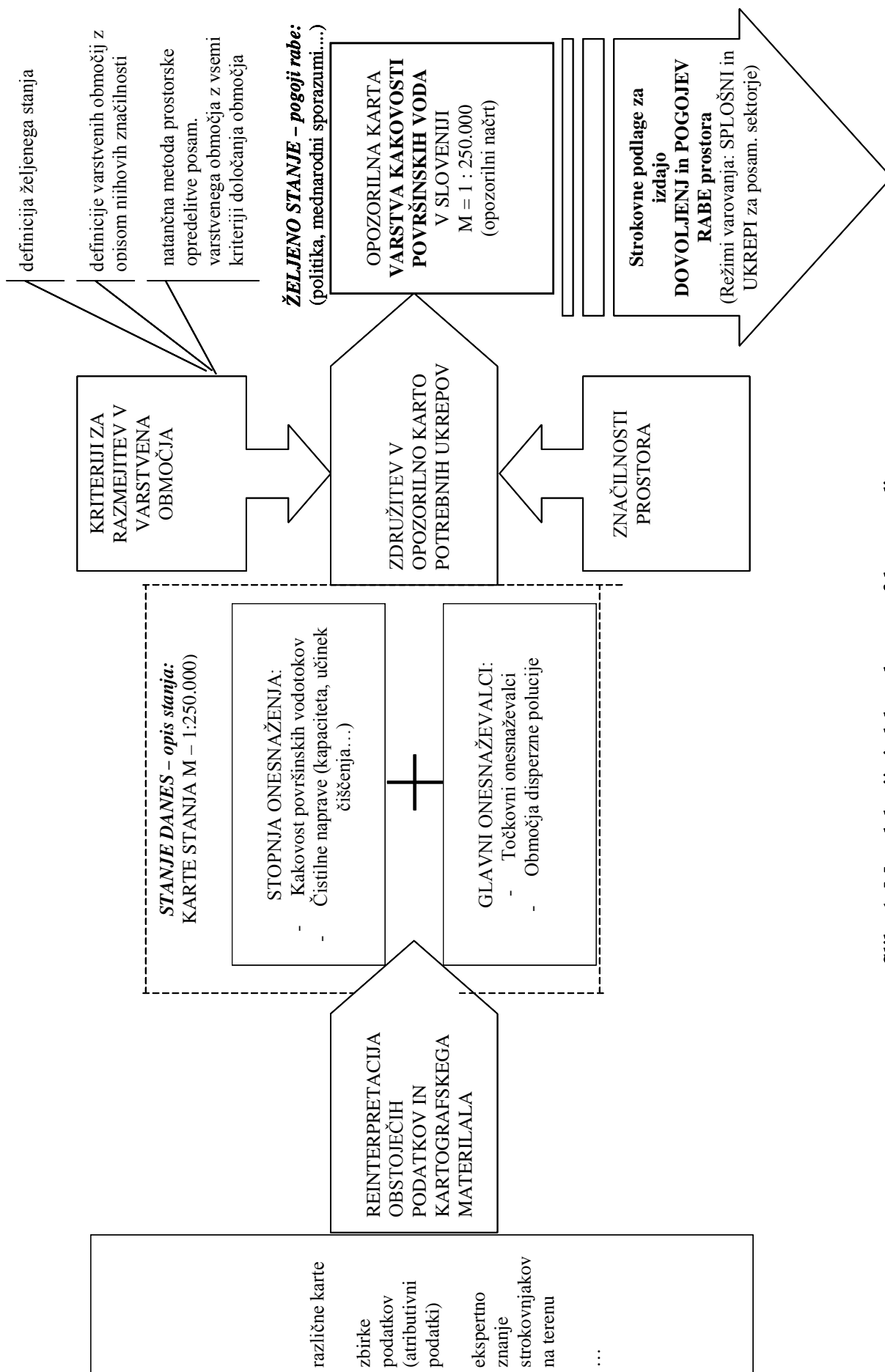
Pri potrebnih ukrepih (preglednica 1, slika 3) smo se osredotočili na ciljno "dobro kakovost" voda in identificirali tista območja, ki potrebujejo čistilne naprave za odpravo točkovnega onesnaženja oz. širše kmetijske, gradbene, gozdarske, hidrotehnične in druge ukrepe za odpravo razpršenega onesnaženja.

4.2. METHODOLOGY OF ELABORATING CARTOGRAPHIC MATERIAL

The cartographic presentation aims to present the connection between the level of pollution, main pollutants and the existing and foreseen measures and provisions to improve the situation as efficiently as possible (Figure 1, Table 1). For this reason maps are presented in two layers: situation maps with a detailed description of all factors which influence the quality of surface waters, and maps of provisions (warning maps), where the long-term vision, i.e. the situation as defined by the policy of water protection, international agreements and similar, is presented through a prism of necessary provisions.

For the presentation of the quality of rivers we chose the familiar colour system, as used by the Hydrometeorological Institute (quality classes: blue = class I, green = class II, yellow = class III, red = class IV), as the data on water quality using five classes (introduced by the EU) are not yet available. Further on, we considered the burden of rivers with point and diffuse pollution as an important information. The main sources of point pollution are marked by rectangular circular segment, where the top of the segment shows the sampling point, i.e. outflow of wastewater, and the segment itself is divided into sub-segments which show the type of pollution and the share of purification (Figure 2a). Diffuse pollution is shown as the pollution due to the urbanisation and intensive agricultural production (Figure 2b). Additionally also the areas with arranged sewage systems and locations of the existing PP (capacity and burdening) are shown, and the locations of the existing dumping grounds are marked.

As far as the necessary provisions are concerned (Table 1, Figure 3) our focus was on the objective of "good quality" of waters. We identified all those areas where purifying plants are needed to eliminate the point pollution, or wider agricultural, constructional, forestry, hydrotechnical and other measures to eliminate the diffuse pollution.



Slika 1. Metodologija izdelave kartografskega gradiva.

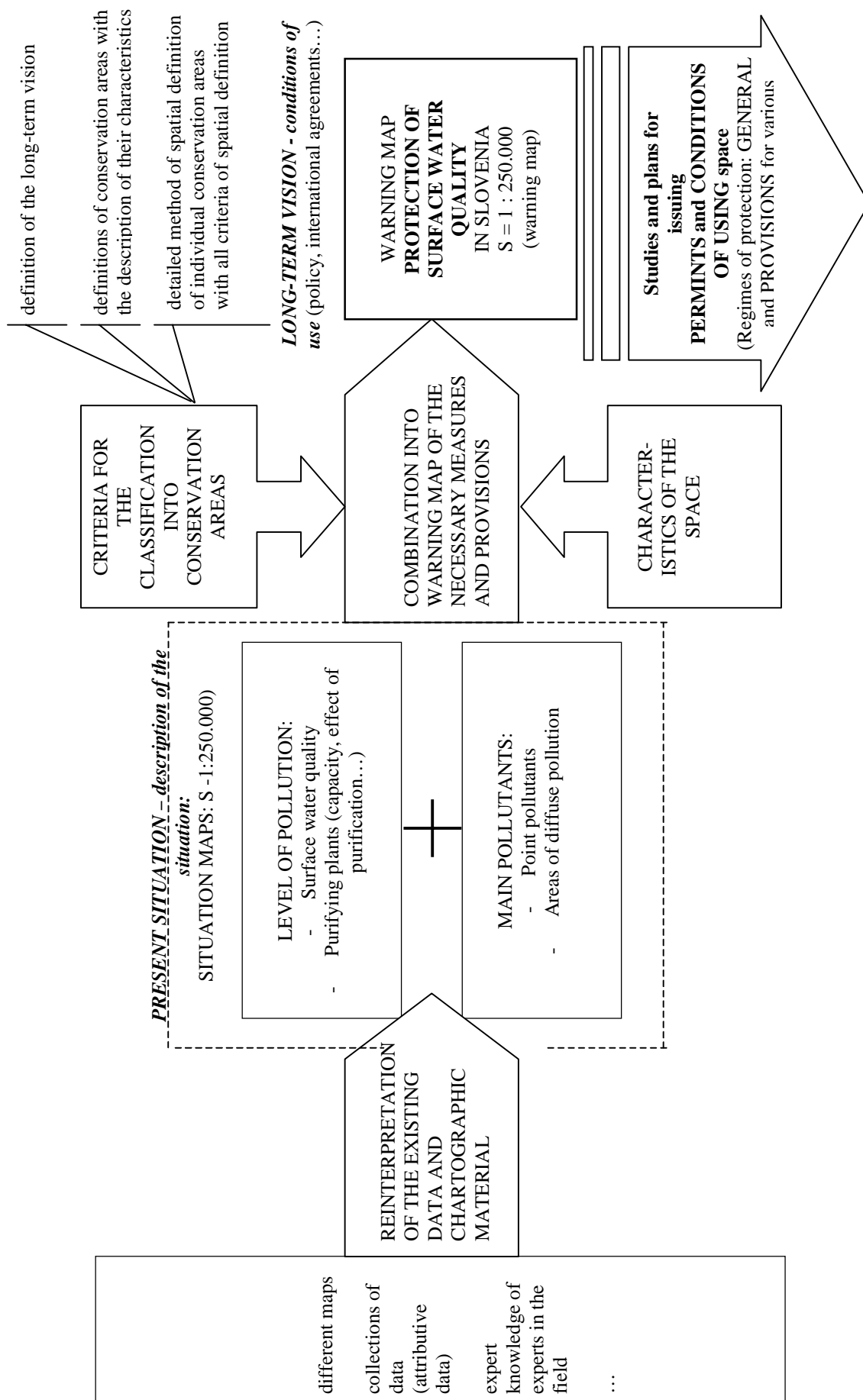


Figure 1. Methodology of elaborating cartographic material.

Preglednica 1. Tabela prikaz grafično prikazanih vodno gospodarskih vsebin za potrebe PPRS: KAKOVOST POVRŠINSKIH VODA

<p>OPOZORILNE IN USMERJEVALNE KARTE M - 1 : 250.000</p>	<p>CILJ USMERJANJA / VAROVANJA</p>	<p>KARTA 1: OPIS OBSTOJEČEGA STANJA vsebinska karte razdeljena v kategorije (z razlago)</p>	<p>KARTA 2: EVTROFIKACIJSKA OBMOČJA, UKREPI IN OMEJITVE vsebinska karte razdeljena v kategorije (z razlago)</p>
<p>KAKOVOST POVRŠINSKIH VODA: (sistem okolje)</p> <p>CILJ: Vse vode v II. Kakovostnem razredu do leta 2010 oz. nekoliko kasneje glede na ekonomsko moč</p>	<ul style="list-style-type: none"> Varstvo delov vodotokov in drugih površinskih voda, ki so še relativno čisti in neobremenjeni Izločitev najbolj obremenjenih območij površinskih voda (ki so potrebni sanacije) 	<p><u>KARTA 1A: KAKOVOST VODA IN TOČKOVNO ONESNAŽENJE – STANJE</u></p> <ul style="list-style-type: none"> kakovostni razredi voda: I., I.-II., II., II.-III., III., III.-IV., IV. razred kommunalne deponije glavni izvori odpadnih voda: skupna bilanca (velikost krožnega izseka je premosorazmerno s količino: $1 \text{ cm}^2 = 10.10^3 \text{ E}$) vrsta onesnaženja (%): industrijsko in komunalno delež čiščenja <p><u>KARTA 1B: ODVOD IN ČIŠČENJE ODPADNE VODE TER DISPERZNA POLUCIJA – STANJE (IN UKREPI)</u></p> <ul style="list-style-type: none"> kakovostni razredi voda: I., I.-II., II., II.-III., III., III.-IV., IV. razred območja disperzne polucije iz kmetijskih površin urbana območja pretežno urejena s kanalizacijo območja disperzne polucije iz urbaniziranih površin: večja gostota poselitve srednja gostota poselitve manjša gostota poselitve obstoječe komunalne čistilne naprave kapaciteta (velikost točke je premosorazmerna s kapaciteto) obremenjenost 	<ul style="list-style-type: none"> evtrofikacijska območja (iz NPVO in mejni vodotoki) prispevna območja za evtrofikacijo odseki vodotokov s prioriteto izvajanja sanacijskih ukrepov (degradirana območja: 3.-4. in 4. Kakovostni razred) odseki vodotokov s prioriteto izvajanja zaščitnih ukrepov: to so območja posebnih vrednosti, kjer so površinske vode še relativno neobremenjene (1. in 1.-2. Kakovostni razred) rezervacije prostora za nove čistilne naprave (usklajeno z direktivo EU): obstoječe stanje in potrebna dogradnja ali novogradnja kopalne vode (nartavna kopalnišča)

Table 1. Table display of graphically presented water management plans and studies for SSMP: QUALITY OF SURFACE WATERS.

WARNING AND DIRECTION MAPS M - I : 250.000	GOAL OF DIRECTION/ PROTECTION	MAP I: DESCRIPTION OF THE PRESENT SITUATION elements of the map are divided into categories (with explanation)	MAP 2: EUTROPHICATION AREAS, MEASURES AND LIMITATIONS elements of the map are divided into categories (with explanation)
<p>SURFACE WATER QUALITY: (system – environment)</p> <p>GOAL: All waters in quality class II by the end of 2010 or slightly later considering the economic ability</p>	<ul style="list-style-type: none"> • Protection of parts of rivers and other surface waters which are still relatively clean and unburdened • Extraction of the most burdened areas of surface waters (which need sanitation) 	<p><u>MAP IA: WATER QUALITY AND POINT POLLUTION – SITUATION</u></p> <ul style="list-style-type: none"> • water quality classes: class I-II, II, II-III, III, IV, IV • dumping grounds • main sources of wastewaters • total balance (size of sector is proportional to the quantity: $1 \text{ cm}^2 = 10 \cdot 10^3 \text{ E}$) • pollution type (%): industrial and communal • purification share <p><u>MAP IB: WASTEWATER TREATMENT AND DIFFUSE POLLUTION – SITUATION (AND MEASURES)</u></p> <ul style="list-style-type: none"> • water quality classes: class I, I-II, II, II-III, III, III-IV, IV • areas of diffuse pollution from agricultural surfaces • urbanised areas mainly with sewage systems • areas of diffuse pollution from urbanised surfaces • large settlement density • medium settlement density • small settlement density • existing communal purifying plants • capacity (size of point is proportional to the capacity) • burden 	<ul style="list-style-type: none"> • eutrophication areas (from NPWS and bordering rivers) • attributive areas for eutrophication • river sections with the priority of sanitation measures (degraded areas: quality class 3-4 and 4) • river sections with the priority of protective measures: these are areas of special values, where surface waters are still relatively unburdened (quality class I and I-2) • reservation of space for new purifying plants (harmonized with the EU directive); current situation and the necessary additional construction or new construction • bathing waters (natural baths)



LEGENDA / LEGEND:
 Ocena kakovosti površinskih vodotokov po razredih HMZ (1989-1995) /
 Surface water quality class assessment (1989-1995)

	1		3
	1-2		3-4
	2		4
	2-3		

Pretok / Flow (vir / source: HMZ)
 > 200 100 50 20 10 5 2 1 < 1 [m³/s]

Industrijska odlagališča / Industrial landfill
 Komunalna odlagališča / Municipal landfill

Onesnaženje iz urbaniziranih območij (vir: MOP, FGG-IZH) / Pollution from urbanized areas (source: MOP, FGG-IZH)
 (1cm² krožnega izseka = 10.000 Eind+kom) / (1cm² of the sequent = 10.000 PE (ind.+mun.))

Ostane E ind. po čiščenju na KČN /
Load of PE ind. after WWTP

Število E ind. priključenih na kanalizacijo /
PE ind. sewerred

Število enot industrije /
Load of PE in industry

Ostane E prebivalstva po čiščenju na KČN /
Load of PE inh. after WWTP

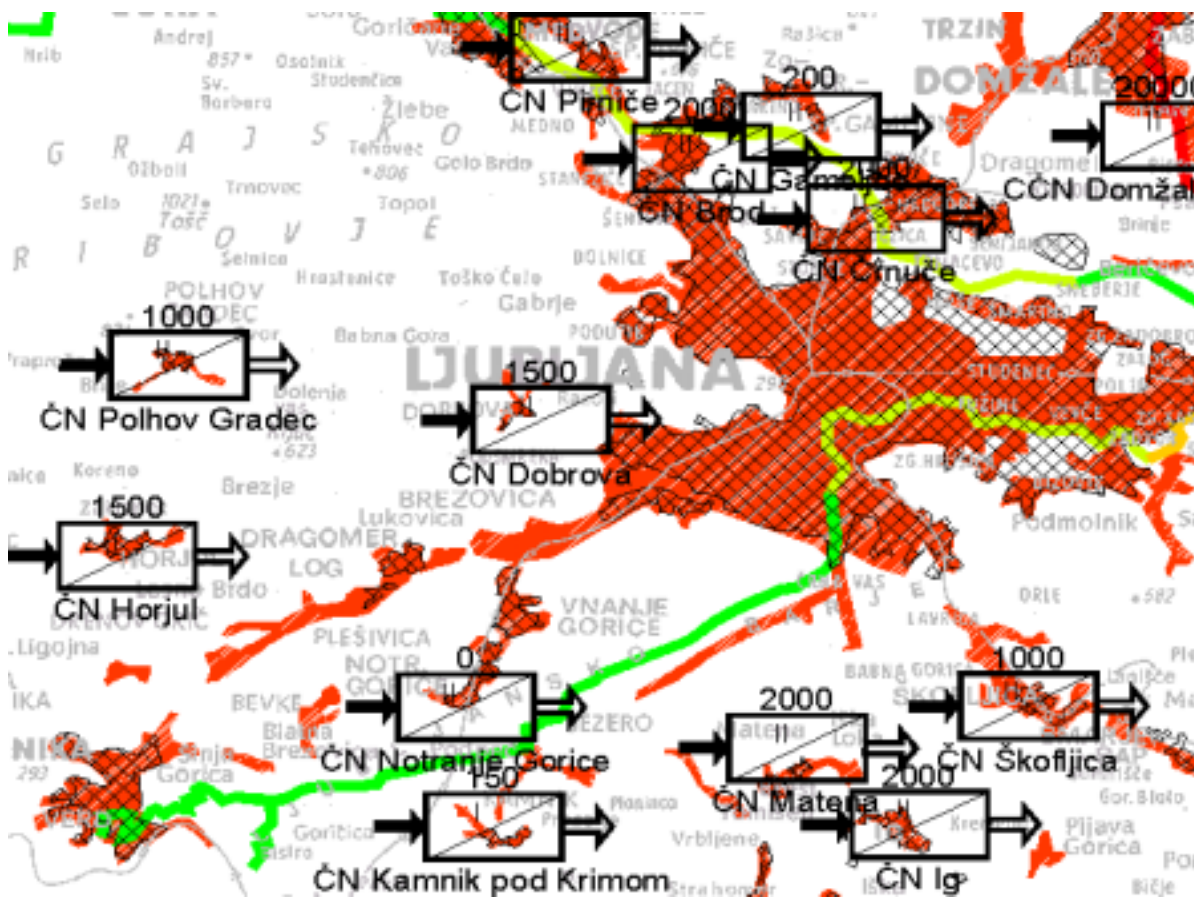
Število E prebivalstva priključenih na kanalizacijo /
PE inh. sewerred

Število enot prebivalstva /
Load of PE inh.

Industry Municipalities

Skupno število enot onesnaženja industrija in prebivalstvo / PE total = PE ind. + PE inh.

Slika 2a. Prikaz stanja kakovosti površinskih voda in točkovnega onesnaženja.
 Figure 2a. Status of surface water quality and point-sources pollution.



LEGENDA / LEGEND :
 Ocena kakovosti površinskih vodotokov po razredih HMZ (1989-1995) /
 Surface water quality class assessment (1989-1995)

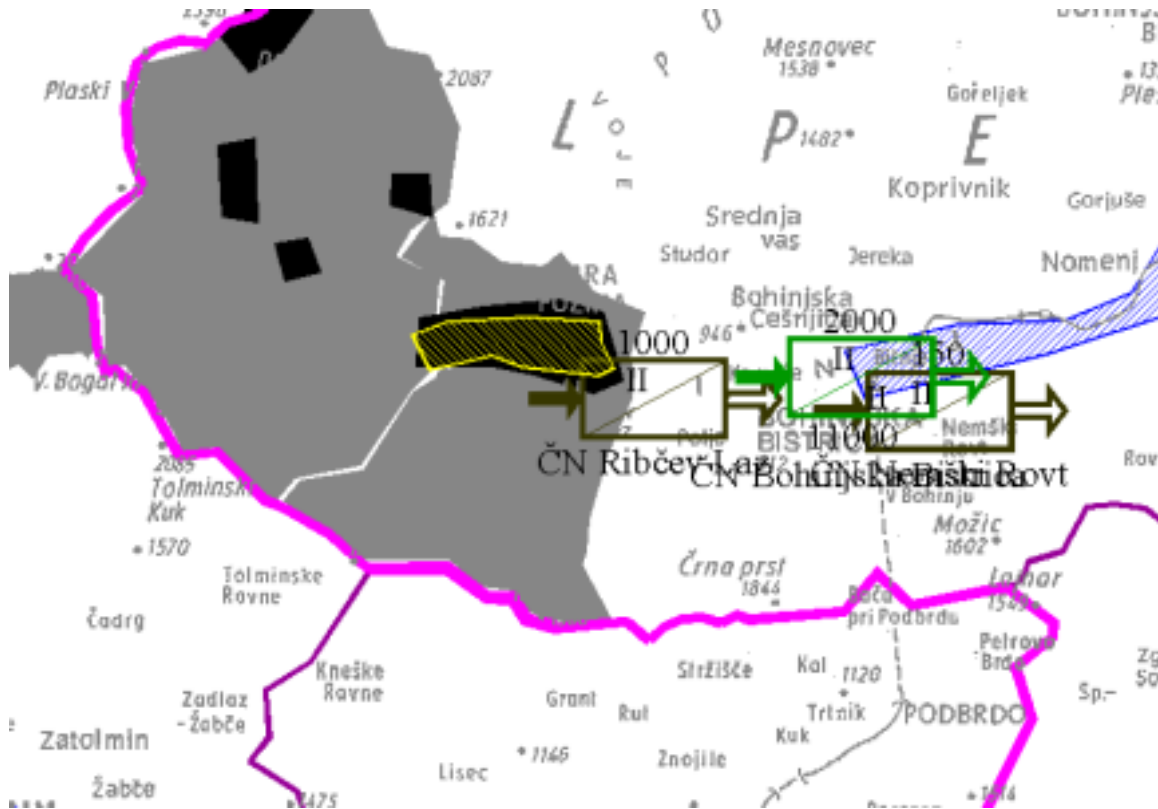
	1		3
	1-2		3-4
	2		4
	2-3		

Obstoječe čistilne naprave (MOP) / Existing WWTP's

	Stage Efficiently
PE	Inštalirano število populacijskih enot na čistilni napravi / Installed load on population equivalents (PE) on WWTP
Stopnja / Stage	Stopnja čiščenja / Stage of treatment I mehansko / mechanical II biološko / biological III odstranjevanje N,P / removal of N, P
Učinek / Efficiency	Učinek odstranjevanja KPK [%] / Removal efficiency for COD

	Območje s pretežno urejeno kanalizacijo (vir: FGG-IZH) / Mostly sewered area
	Območje disperzne polucije iz kmetijskih površin / Dispersed pollution from agricultural areas
	Območje disperzne polucije iz urbanih površin (vir: UPP) / Dispersed pollution from urbanised areas
	Aglomeracija (eno ali več naselij) / Agglomeration

Slika 2b. Prikaz stanja odvoda in čiščenja odpadne vode ter disperzne polucije.
 Figure 2b. Status of sewerage extent, waste water treatment and dispersed pollution.



LEGENDA / LEGEND :

Čistilne naprave - situacija za leto 2006 (vir: MOP, FGG-IZH) / WWTP's - situation for year 2006

- Obstoječe čistilne naprave, za katere rekonstrukcija ni potrebna / Existing WWTP's, no upgrade needed
- Obstoječe čistilne naprave, ki potrebujejo rekonstrukcijo / Existing WWTP's upgrade needed
- Nove čistilne naprave / New WWTP's

PE-o Inštalirano število populacijskih enot na obstoječi čistilni napravi / Designed PE on existing WWTP's
 PE-n Inštalirano število populacijskih enot na novi (rekonstruirani) čistilni napravi / Designed PE on designed (upgraded) WWTP's

stopnja / stage-o Stopnja čiščenja na obstoječi čistilni napravi / WW treatment stage on existing WWTP's
 stopnja / stage-n Stopnja čiščenja na novi (rekonstruirani) čistilni napravi / WW treatment stage on designed (upgraded) WWTP's

<ul style="list-style-type: none"> I mehanško / mechanical II biološko / biological III odstranjevanje N,P / removal of N,P 	}
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- Evtrofikacijska območja (iz NPVO) / Eutrophication sensitive areas
- Prispevno območje za evtrofikacijo / Catchment area of eutrophied water body
- Odseki vodotoka s prioriteto izvajanja sanacijskih ukrepov / Stretches of watercourses that need sanitation
- Odseki vodotokov s prioriteto izvajanja zaščitnih ukrepov / Stretches of watercourses that need protection measures
- Kopalna voda / Bathing water
- Odseki vodotokov primerni za rekreacijo / Suitable for recreation (vsi obstoječi na vodo vezani športi - direkten kontakt z vodo) / (all water sports - direct contact with water)

Slika 3. Prikaz omejitev in usmeritev rabe in razvoja v prostoru.
 Figure 3. A display of limitation and directions of spatial use and development.

5. ZAKLJUČEK

Varstvo kakovosti vode kot naravnega vira mora biti ustrezno vgrajeno tudi v postopke prostorskega planiranja z določanjem pogojev rabe prostora. To je še posebej pomembno pri disperzni poluciji in uveljavljanju imisijskih meril varstva kakovosti voda. Strokovne podlage za izdelavo novega prostorskega plana RS so zato predstavljene v obliki temeljnih inventarizacijskih kart, te pa so nadgrajene s kartami opozorilnih in usmerjevalnih kart. Usmeritve rabe na kartah varovanja kakovosti površinskih voda zato neposredno izhajajo iz stanja onesnaženosti okolja in potrebnih ukrepov za sanacijo in izboljšanje tega stanja, kar povečuje razvidnost vzročne povezave med stanjem in ukrepi. Upamo, da bo tak način prikaza informacij, poleg razvidnosti potrebnih ukrepov, hkrati tudi ustrezno uvedel znanje o vodah in gospodarjenja z vodami na področje prostorskega planiranja in vedenja v prostoru.

5. CONCLUSION

The protection of the quality of water as a natural resource has to be incorporated also into the procedures of spatial planning by defining the conditions of using the space. This is especially important at the diffuse pollution and for the definition of immission criteria of water quality protection. Water management plans and studies for the elaboration of the new State Spatial Master Plan of RS are for this reason presented in the form of basic inventarisation maps, and these are upgraded by warning and directive maps. The recommendations for use of space presented in the surface water quality protection maps, therefore, result directly from the current situation of environmental pollution and the necessary provisions for the sanitation and improvement of this situation. Such presentation makes it easy to understand the cause-effect connection between the situation and the provisions. We hope that this type of presenting information will besides an easy understanding of the necessary provisions also introduce the adequate knowledge of the science on waters and water management to the field of spatial planning and behaviour in the space.

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