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RAZPRAVE IN RAZISKAVE 10

strokovni posvet

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BARJA IN VARSTVO NARAVE, prispevki strokovnega posveta
BOGS AND NATURE CONSERVATION, proceedings papers of the seminar

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Jurij DOBRAVEC

FILOZOFIJA NARAVE IN VARSTVO NARAVE

The philosophy of nature and nature conservation

Človeštvo premore mnogo filozofij. Naša kultura je utemeljena na starih verstvih – nekakšni ljudski kulturi Srednjega Vzhoda in v grškem helenizmu. Prispevek sicer ne bo obravnaval zgodovinskega pregleda filozofije narave, na tem mestu pa velja omeniti – če že ravno govorimo o močvirjih – da je Tales iz Mileta, ki velja za prvega filozofa, utemeljeval vodo kot arche (prapočelo) narave.

Danes v varstvu narave govorimo največ o akcijah. Najpogostejše besede so dejavnost, upravljanje, urejanje, usmerjanje, ukrepi. Celo besedna zveza akcija brez akcije se pojavlja: nič storiti v naravovarstvenem žargonu očitno prav tako pomeni biti aktiven. Zakaj pa počnemo vse to? Iz katerih razlogov varujemo naravne pojave? Zaradi življenja ali lepote? Gre za razum ali čustvo? Ali nam je do narave same ali morda do virov za človekov razvoj? Skrbimo za obliko ali vsebino? Ali torej obstaja splošna podlaga za naravovarstvene dejavnosti – ali – je vse skupaj odvisno od posameznikovega mišljenja – najboljšega možnega v danem trenutku? Če se povrnemo k Talesu v antični Milet: voda je zibelka narave in vir življenja. Tudi uporabna je za človeka. Toda pomislimo na barja, močvirja, moroste – vse te čudne naravne stvore: čemu jih imamo?

Vsi smo že slišali, da obstajajo filozofije znanosti, filozofije umetnosti, kulture in podobne. Prav tako smo seznanjeni z obstojem današnje filozofije narave z vso razvejanostjo: od kozmologije kot splošne znanstvene filozofije o redu v vesolju na eni strani, do praktičnih filozofij, pravzaprav že okoljskih etik, ki obravnavajo praktične pristope k odnosom med človekom in naravo. So njihova razmišljanja lahko splošna in skupna podlaga za varovanje narave ali smo naravovarstveniki sami tisti, ki moramo zgraditi lastno filozofijo varstva narave kot podlago za akcijsko zgradbo. Končno: mar ni stavba brez temelja vegasta?

Humanity has plenty of philosophies. Our culture is based on the ancient religions – a kind of public philosophy of Middle East and certainly on a Greek Hellenism. The purpose of this article is not to perform a historical overview of the philosophy of nature, but it is worth knowing – if we today are talking about bogs – that the very first Greek thinker, Tales of Milet, substantiate water as an arche (basic element) of the Nature.

Nature conservation today is more or less an activity. We all talk about actions, management, arrangement, regulating, even actions without action: to do nothing in nature conservators' language meant to be active without doing anything. But why we are doing all this? What is the reason to preserve nature features? Is it life or beauty? Is it ratio or sentiment? Is it nature itself or sources for human development? Is it form or contents? Do we have some common basis for all conservation actions – or – is it dependant on individual thinking – the best possible? If we now go back to Tales of Milet: water is an origin of nature and the cradle of life. It is and will be useful for human. But let us think about bogs, swamps, morass – all those strange features: why are they with us?

We've all heard about philosophy of science, philosophy of art, of culture etc. We are also acquainted with present-day philosophy of nature with many branches. On one side with cosmology – a common scientific philosophy of order in the universe and on the other side with many practical philosophies, strictly speaking environmental ethics, that contribute practical advices on human-nature relationship. Can their thinking be a common basis for nature conservation? Do nature conservators have to build our own philosophy of nature conservation as a foundation for action structure and finally: isn't the building weak and uneven without foundation?

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1 Uvod

Človeštvo premore mnogo filozofij. Naša kultura je utemeljena na starih verstvih – nekakšni ljudski kulturi Srednjega Vzhoda in v grškem helenizmu. Prispevek sicer ne bo obravnaval zgodovinskega pregleda filozofije narave, na tem mestu pa velja omeniti – če že ravno govorimo o močvirjih – da je Tales iz Mileta, ki velja za prvega filozofa, utemeljeval vodo kot arche (prapočelo) narave.

Danes v varstvu narave govorimo največ o akcijah. Najpogostejše besede so dejavnost, upravljanje, urejanje, usmerjanje, ukrepi. Celo besedna zveza akcija brez akcije se pojavlja: nič storiti v naravovarstvenem žargonu očitno prav tako pomeni biti aktiven. Zakaj pa počnemo vse to? Iz katerih razlogov varujemo naravne pojave? Zaradi življenja ali lepote? Gre za razum ali čustvo? Ali nam je do narave same ali morda do virov za človekov razvoj? Skrbimo za obliko ali vsebino? Ali torej obstaja splošna podlaga za naravovarstvene dejavnosti – ali – je vse skupaj odvisno od posameznikovega mišljenja – najboljšega možnega v danem trenutku?

Vsi smo že slišali, da obstajajo filozofije znanosti, filozofije umetnosti, kulture in podobne. Tudi posamezne panoge v gospodarstvu imajo svoje filozofije, celo posamezna podjetja. Prav tako smo seznanjeni z obstojem današnje filozofije narave z vso razvejanostjo: od kozmologije kot splošne znanstvene filozofije o redu v vesolju na eni strani, do praktičnih filozofij, pravzaprav že okoljskih etik, ki obravnavajo praktične pristope k odnosom med človekom in naravo. So njihova razmišljanja lahko splošna in skupna podlaga za varovanje narave ali smo naravovarstveniki sami tisti, ki moramo zgraditi lastno filozofijo varstva narave kot podlago za akcijsko zgradbo.

Prispevek se nanaša na naravo kot physis in kot kosmos, kot vseobstajanje in urejenost – nasprotje kaosu, na filozofijo kot človekovo notranje hrepenenje po modrosti in na varstvo narave kot enega od človekovih prvinskih odnosov z naravo. Skuša izstopati iz sedanje paradigme varstva narave, za katero vsi slutimo, da ni uspešna: človek naravo uničuje vse bolj, problemi se stopnjujejo na vseh ravneh: od globalnih dogovorov o ohranjanju Zemlje do zadnjega neustrezno postavljenega senika na robu močvirja v narodnem parku.

2 Premiki pojmovanja filozofije narave skozi zgodovino

Kot je že omenjeno v uvodu, prispevek ne bo podrobneje obdelal zgodovine filozofije narave po

1 Introduction

Numerous philosophies have evolved in the history of mankind. Our culture is based on ancient religions, on a 'popular' culture of the Middle East, and on Greek Helenist culture. Although this paper does not intend to give a historical overview of the philosophy of nature, it is interesting to note, the wetlands being the topic in discussion, that Thales of Milet, often referred to as the first philosopher, regarded water as arché, the first principle of life.

Nowadays, nature conservation is mostly about action. We constantly use words like activity, management, regulation, direction, measures. We even use the phrase action without action as if in the language of nature conservation, to do nothing would mean the same as to be active. And why do we do all that? What reasons lie behind our efforts to protect natural phenomena? Is it life or beauty? Reason or emotion? Do we actually care about nature or perhaps more about the resources necessary for human development? Do we care about the form or the content? Is there a common groundwork for nature conservation activities, or does it all depend on an individual's state of mind – the best possible reaction in a given moment?

We have all heard of philosophies of science, philosophies of art, philosophies of culture and the like. Several economic branches have their philosophies, and some companies have developed their own. There is also the modern philosophy of nature in all its diversificiation, ranging from cosmology as the general scientific philosophy about the order in the universe to practical philosophies or environmental ethics that study practical approaches to the relations between man and nature. Can the mentioned findings be generalised into a common basis for nature conservation or should nature conservationists attempt to create their own nature conservation philosophy as the basis for nature conservation action structure.

This paper refers to the nature as physis and cosmos, as the all-existing force and order, as the direct opposite of chaos. Philosophy is regarded as man's inner longing for wisdom and nature conservation as one of man's pristine relations with nature. The essay tries to look from a distance at the modern nature conservation paradigm which is often thought to have failed: man is destroying nature in many ways and problems are accumulating on all levels of our societies, enbedded in global agreements on the preservation of the Earth and in every hayrack built without necessary approvals on a bog edge in a national park.

2 Historical milestones in the philosophy of nature

As mentioned in the introduction, this paper is not aimed at providing a detailed historical overview of the philosophy of nature by its representatives and schools. This task shall

njenih predstavnikih ali šolah. To bomo prepustili zgodovinopiscem in filozofom samim. Na kratko se bomo ustavili le na štirih miselnih točkah zahodnoevropske zgodovine: v antični Grčiji, pri Tomažu Akvincu, v renesansi nekako pri Deskartesu, in v današnjem času.

2.1 Antika

Praktično vse antičnogrške mislece poimenujemo filozofi in vsi so dejansko bili takrat filozofi narave, saj so se ukvarjali z naravo, njenimi fenomeni, bitjo in bistvom,izvorom – hkrati pa so naravo tudi ne nek način analizirali, razstavljali na prafaktorje, matematično in logično opredeljevali, razvrščali in podobno. Bili so filozofi narave in filozofija narave je dejansko pomenila celotno znanost, vključujoč naravoslovje. Večina del iz takratnega časa bi v luči današnjih znanstvenih paradigm in doktrin veljalo za čisto špekulacijo. Pojem eksperimenta, ki je danes v znanosti tako izključujoče obvezen, je bil takrat dobesedno sramota in je bil domena sužnjev, delavcev. Filozofi, torej ljubitelji modrosti, so opravljali bistveno pomembnejšo nalogo: mislili so. Njihova misel je bila široka, zavzemala je celoten kosmos, ki je stal nasproti kaosu. Physis – stvarni svet, narava – so pravzaprav opisovali, na nek način raziskovali – to je bilo njihovo naravoslovje. Vendar jim to ni bil končni cilj. Utemeljevali so vzroke za pojave, ki so jih opazili v physis. Najprej matematično-logično, kot logos. Praktična dognanja, ki jih danes v njihovih delih vidimo naravoslovci so, vse tako kaže, zgolj stranski produkti njihove bistvene dejavnosti – razmišljanja. Zato ni čudno, da ti nek Tales iz Mileta v življenju dokaže razmerja dolžin daljic na dveh pod določenim kotom sekajočih se premic (Talesov izrek), natančno napove sončni mrk (585 pr.Kr.), hkrati pa dokazuje vodo kot prapočelo vsega živega (oživljena voda).

2.2 Srednji vek

Druga točka filozofije narave, ob kateri se na kratko ustavljam, je sveti Tomaž Akvinski. Ključna razvojna sila zahodne zgodovine, krščanstvo, je že z njim preusmerilo tako imenovani mračni srednji vek. Pokristjanila je antično filozofijo in jo s tem vrnila v takratni tok kulturnega in hkrati znanstvenega razvoja. Kako je Akvinski zmogel pravzaprav premagati izjemen, zaradi krvavih preganjanj kristjanov v prvih stoletjih popolnoma razumljiv protiantični nastroj Cerkve, kljub množici študij ni popolnoma jasno. Gotovo pa je, da je sicer preko arabskih prevodov obnovil precejšen del grške filozofije. Njegova filozofija narave je pravzaprav kratka, v podrobnosti se sploh ne spušča. Vse, kar so razpravljali stari Grki, jim na nek način priznava, vendar kot prapočelo vsega postavlja Boga. Na nek način je postavljena vzporednica: Bog – kosmos na eni strani in hudič – kaos na drugi. Pojavi

be left to historians and philosophers. Nevertheless, I will provide a brief presentation of four mental milestones in the West European history: ancient Greece, Thomas Aquinas, Descartes and the Renaissance period, and the present time.

2.1 Antique

Practically all ancient Greek thinkers are called philosophers. They studied nature, natural phenomena, being and essence, the origin, and can rightly be called philosophers of nature. On the other hand, they also analysed nature, divided it into prefactors, defined it mathematically and logically, classified it, etc. They were philosophers of nature, and in their time the philosophy of nature joined all scientific disciplines, including nature sciences. Most works by ancient thinkers would be considered pure speculation if seen from the point of view of present-day paradigms and doctrines. Experiments, an absolute must of modern science, were regarded unhelpful, shameful even, and were only conducted by slaves and workers. Philosophers, wisdom lovers, performed a much more important task: they thought. And the scope of their thinking was wide, encompassing the entire cosmos that stood in opposition to the chaos. Nature, physis, was described and researched, forming the topic of nature science. This was not, however, their final goal. Ancient philosophers tried to find causes behind the phenomena they observed in physis. First, they approached the problem in a mathematical and logical manner, as logos. Practical findings that nature scientists discover in the works of these philosophers today seem to be merely side products of their main activity – thinking. It is therefore not surprising that a Thales of Milet, for example, achieved all of the following in his lifetime: he established that, if several parallel straight lines are cut by two transversal lines, the ratio of any two segments of one of these transversals is equal to the ratio of the corresponding segments of the other transversal (Thales' axiom), he made a precise prognosis of a solar eclipse in 585 BC and identified water and humidity as the first principle of life (live water).

2.2 The Middle Ages

Another milestone in the philosphy of nature I wish to present was set by Thomas Aquinas. Through him, Chistianity as the key development force of the western civilisation redirected the course of the 'dark' Middle Ages. Christian beliefs were mixed with antique philosophy, making antique once again part of cultural and scientific development. Despite numerous studies, it remains unclear how Thomas Aquinas managed to overcome the powerful 'anti-antique' tendency of the Church, which was an entirely understandable consequence of bloody killings and persecution of Christians in the first centuries AD. Using Arabic versions of Greek philosophic works, Thomas Aquinas succeeded in reviving a significant part of Greek philosophy. St. Thomas' philosophy of nature is rather short, and devoid of detail. Up to a point, Aquinas agrees with ancient Greek philosophical thought, but

se tudi analitični pristop do vprašanja resnice. Bog je pri njem absolutna resnica in nič ne more obstajati brez resničnega temelja – vendar to hkrati zbudi tudi negacijo, kar pozitivno prispeva k razvoju miselnega toka. Krščanski Bog Stvarnik torej postane ključni dejavnik filozofije narave.

2.3 Razsvetljenstvo

Razsvetljenstvo prinese v filozofiji narave zopet nov miselni premik. Razvoj posameznih znanosti, če jih takrat že lahko tako poimenujemo, je pomenil konec filozofije v prejšnjem pomenu. Astronomija, medicina, naravoslovje: vse to postaja vedno manj ljubezen do modrosti. Prakse je vedno več, opazovanja in poskusi se množijo, sledijo nova odkritja. Filozofi narave niso več hkrati naravoslovci. Vedno bolj se specializirajo, nekako gredo tudi sami v smer znanosti, razlage, logičnih izpeljav, celo eksperimenta. Filozofija postaja samostojna veda, na eni strani igra povezovalno vlogo med vedno bolj razvejanimi znanostmi, po drugi pa se usmerja v iskanje vzrokov, bistva in smisla vseh pojavov: filozofija narave seveda pojavov v naravi. Lahko bi rekli, da so se filozofi narave s tem otresli nadležnega, v antičnem jeziku suženjskega dela naravoslovja – ostalo jim je mišljenje, razmišljanje, ki pa je drugačno od tistega v antiki. Delno so z osvoboditvijo sicer zgubili neposredni stik z razvojem posameznih ved, istočasno pa s svojimi logičnimi razpletanji lahko ne le capljajo za znanostjo, kot bi si kdo mislil ob dejstvu, da filozofi skušajo še vseeno nekako držati človekove umotvore v nekakšni celoti, ampak celo usmerjajo vse bazične znanosti. Predvsem pri teoretični fiziki ali teoretični biologiji. Noben izstop iz paradigem ni mogoč brez globokega filozofskega premika. Znanost dožene skoraj vse, potem pa se na neki točki asimtotičnega približevanja resnici ustavi. Lahko se celo zapre sama vase, nastanejo doktrine, celo dogme, ki škoduje razvoju človeštva nasploh. Pomislimo samo na razvoj razvoj geometrije od preprostih evklidskih prostorov proti dejansko obstajajočim večdimenzionalnim, večkratno ukrivljenim prostorom, ki jih danes astronomi dokazujejo tudi ekperimentalno. Ali pa miselni premik od Newtonove mehanike v relativnostne teorije in kvantno mehaniko, ali usmeritev v evolucijske teorije od darvinizma naprej. Do takšnih premikov ne pride iz eksperimentov samih, ampak je potreben koreninski premik, ki ga zmore ustrezna interakcija med teoretično znanostjo in filozofijo te znanosti.

2.4 Sodobnost

Zadnje stoletje je zaznamovano z veliko razvejanostjo misli. Prav nič drugače kot v vseh znanostih. Dobe in filozofske šole si sledijo v razdobjih parih let, ljudi je vedno več, filozofov je vedno več, tudi filozofov narave. Vsak ima svoj predalček. Nekaj skoraj

identifies God as the first principle of life. In a way he sets a parallel between God and cosmos on the one hand and the devil and chaos on the other. He also opens analytical approach to the question of truth. According to Thomas Aquinas, God is the absolute truth and nothing can exist without God. This created a feeling of negation that contributed positively to the development of thought. The Christian God the Creator thus becomes the key element in the philosohy of nature.

2.3 Reformation Movement

The Reformation Movement represents a break in the philosophy of nature. Development of individual sciences, if they deserved to be called sciences at the time, marked the end of philosophy in its old sense of the word. Astronomy, medicine, nature science were less and less about the love of wisdom. Practice and observation were on the increase, experiments were multiplying, and new findings followed. Natural philosophers were no longer nature scientists. They tended to specialise, their main orientation being towards science, explanation, logical deductions and experiments. Philosophy was becoming an independent science which, on the one hand, formed the link between increasingly diversified sciences and, on the other hand, focused on the search for cause, essence and meaning of all phenomena. In this way, the philosphers of nature rid themselves of the annoying part of nature science, and what remained was the sophisticated activity of thinking, although different from the antique thinking. In the course of these changes, the contact with the development of sciences was partly lost, but logical conclusions enabled philosophers to not only follow in the footsteps of other sciences but also, surprising though it may seem, direct the course of all fundamental sciences. Their role was most important in teoretical physics and theoretical biology. No separation from pagadigms was possible without a deep philosophical movement. Science can achieve almost anything, but then, at a certain point of its asymtotic approach to truth, it suddenly stops. It may become exceedingly involved with itself, creating doctrines and even dogmas that are harmful to the development of mankind in general. The progress in geometry from the simple notion of Euclidian space towards multidimensional spaces with multiple curvatures which astronoms are able to prove experimentally today is a perfect example of the distance philosophical thought is able to overcome. Similarly inspiring is the progress from Newton mechanics to relativity theories and, finally, to quantum mechanics, or the development of evolution theory spurred by the Darwinism. Such breaks in science can not derive from experiments alone, there needs to be a root change that can only be caused by an appropriate reaction between a theoretical science and its philosophy.

2.4 Modern times

The 20th century was famous for its diversity of thought. Similarly, so were all sciences. Eras and philosophical schools arose every couple of years, populations were

klasikov se ohranja v nemškogovorečem območju. Opazna značilnost je odvisnost od družbenopolitičnih razmer. Nemške filozofe tridesetih let prejšnjega stoletja izrazito označuje bodisi arianstvo bodisi antiarianstvo. Sovjetski filozofi narave so seveda izrazito realsocialistični. Vse močnejša prevlada pa je v zadnjih desetletjih opazna iz Združenih držav Amerike, od koder prihajajo nekakšne praktične filozofije, tiste, ki se na tak ali drugačen način splačajo, če smem uporabiti kar to vulgarno besedo. Pogosto so mešanice srednjeevropskih, recimo nemških klasikov, imajo malo pridiha daljnega Vzhoda, in so ameriško vehementne. Nekatere od njih imajo zelo kratek rok trajanja, so nekakšne pop-filozofije. Zaradi splošne globalizacije in široke uporabe angleščine v svetu se te struje hitro širijo. Tiste filozofije, ki se ukvarjajo z naravo, so prav tako izrazito praktične – in seveda s tem skorajda niso več filozofije. V bistvu se pod tem imenom danes vedno bolj razumemo okoljske etike, ki obravnavajo odnos med človekom in naravo, še pogosteje med človekom in njegovim okoljem. Gre za premik v atropologizem. Človek je središče vsega in filozofija narave v bistvu danes, razen nekaterih preostakov klasičnih, na primer kozmoloških šol ali teoretičnih , obravnava človeka. Narava kot taka je pravzaprav izrinjena.

3 Varstvo narave – različni pristopi k stroki

Dejavnost varstva narave načelno obravnava odnos človek – narava. Ta odnos v osnovi lahko razdelimo na intrinzični odnos, kjer naravi priznavami njeno lastno vrednost in utilitaristični odnos, kjer je vrednost narave merimo z njeno uporabnostjo za človeka. Čeprav je človek del narave, sta oba odnosa logična in smiselna, pri obeh sta oba pola, torej človek na eni in narava na drugi strani globalno jasno opredeljiva zaradi tako imenovane socialne evolucije človeka, ki je človeka kot misleče bitje izločilo iz izključne odvisnosti od biološke. (Težave se pojavijo pri tretjem odnosu, ki ga večkrat srečamo pri obravnavah te tematike in ki ne sodi v kontekst tega prispevka. To je odnos človek – okolje, kjer okolje ni jasno določen nasprotni pojem, saj je sam po sebi zelo antropološki in v večini primerov tu človek vzpostavlja odnos s samim sabo). Torej govorim o odnosu človek – narava, s čemer se končno dejavnost varstva narave v ožjem smislu tudi dejansko ukvarja.

Danes se z varstvom narave ukvarjajo mnogi. Ali je to utemeljeno in ali gre dejansko za varovanje narave ali morda le za spreminjanje vplivov (na primer v težje merljive v najbolj grobih primerih) se dokaj hitro pokaže v kriznih primerih. Če je dejavnost pristna, torej pristno varstvo narave, bo kot takšna vzdržala, sicer bo občasno kompenzirala prizadevanja s še večjim uničevanjem narave, kot bi ga sicer. Večino ekonomskih dejavnosti, ki si nadenejo krilatice bio in eko, lahko s stališča dejanskega prispevka k varovanju

increasing and so were the numbers of philosophers, even philosophers of nature. Each philosopher of nature had his/her own drawer, his/her own classification. Some classical philosophers still worked in German areas. They were well-known for their dependence upon social and political circumstances. German philosophers of the 1930s were either supporters of the Soviet philosophers or devoted advocates of Real Socialism. In recent years, the USA have strengthened the foothold in philosophy through the introduction of practical philosophies, that is the philosophies that pay, in one way or the other. These philosophies contain some elements of Central European, say German classical philosophers, a dash of the Far East and the vehemence of the USA. Some of them, called pop-philosophies, are rather short-breathed. However, globalisation trends and worldwide usage of English greatly contribute to their expansion. Even the philosophies dealing with nature have their expressed practical side – and, of course, barely deserve to be named philosophies. Today, philosophy of nature is more and more about environmental ethics, focusing on the relationship between man and nature, and more often so, between man and his environment. A turn towards anthropologism. Man is at the centre of all things and, with the exception of some remains of the classical, cosmological or theoretical schools, the philosophy of nature is primarily involved with man. Nature as such has been pushed out.

3 Different approaches to nature conservation

In principle, nature conservation deals with the man-nature relationship. In its basic form, this relationship can be divided into an intrinsic relation which readily acknowledges the value of nature, and the utilitarian relation in which the value of nature is measured through its usability for man. Although man is a part of nature, both relations are logical and sensible and in both the two poles, man on the one side and nature on the other, are easy to determine on account of the social evolution of man, which excluded man as a thinking being from being utterly dependant on biological evolution. (More difficult to define, however, is the third relation which is often encountered in debates on this issue and which is not relevant to this paper. This is the man–environment relation in which the environment does not have a clear counterpart since it is in itself highly anthropological and in most cases this connection is about man forming a relation with himself.) I shall therefore address the man–nature relation, which is, after all, in the focus of nature conservation activities.

Today, many people are involved in nature conservation. Crisis situations, however, are quick to reveal whether this dedication is in fact to nature conservation or to impact modifications (e.g. modification into impact forms that are hard to measure). If the activity is a result of dedicated nature conservation efforts, it will survive. Otherwise, it will occasionally compensate its efforts with even more severe degradations of nature than it would normally cause. Most economic activities decorated with prefixes eco- and bio-, can only be evaluated for their actual contribution to nature conservation from the standpoint of current economic

narave ocenjujemo v času ekonomskih problemov. Poglejmo si nekaj najbolj pogosto opaženih pristopov k varstvu narave.

3.1 Formalistični pristop

Bistvo tega gledanja na naravo je iskanje oblik in kombinacij oblik, ki se v njej pojavljajo. Formalisti se običajno ne ustavljajo le ob makrooblikah, ampak posegajo tudi v detajle, ki jih kasneje v obliki uporabnih ali okrasnih predmetov bolj ali manj abstraktno prenašajo v človeškemu očesu dosegljive dimenzije. To poglabljanje je običajno parcialno, saj ostane na oblikovni ravni, celo v funkcionalnost se spušča le takrat, ko je že prej spoznana s strani neformalistov in kadar je ta človeku v danem trenutku uporabna.

V tipičnem formalizmu je značilno tudi ocenjevanje vrednosti in rangiranje posameznih predelov narave. Po principu številčne redkosti nastajajo sinteze kot so "ogrožena živa bitja", po principu oblikovno-estetske značilnosti pa "varovani ekosistemi" in podobno. Ti objekti so zaradi tega gledanja več vredni na račun okoliških, ki v naravi predstavljajo prav tako enakovreden del, čeprav so na videz čisto običajni, celo neugledni. Zaradi njihove navidezne manjvrednosti jih zato "lahko žrtvujemo" za preprečevanje anarhije obiskovanja, to je v ureditev za sodobnega človeka-turista dostopnih poti in infrastrukture kot opreme tako imenovanih naravnih spomenikov.

3.2 Antroposuperiorični pristop

Izvor takega gledanja je skoraj gotovo v poenostavljenih razlagah judovskih in grških naukov, ki so podlaga sedanji krščanski evropski kulturi. Ti nauki strogo ločujejo človeka od rastlin in živali, čeprav jih v naravi druži izrazito enotna lastnost, to je življenje. Duševna razlika med človekom in živalmi je posplošena tudi na biološki nivo. Človek je pri razlagi Biblije spregledal Božji nauk "skrbita za vrt". Besede "podvrzita si zemljo in ji gospodujta", niso vzete kot gospodarno uporabljanje zemeljskih dobrin, ampak kot izkoriščanje do tiste mere, ki dokazljivo ne ogroža človeka. Žal sta mera in dokazljivost časovno spemenljiva pojma. Kljub osnovnemu nasprotju samega nauka se človek predrzne zagrešiti izvirni greh - delati se vladarja nad vsem, torej enakega Bogu. Človek se odloča jemati Bogu, namesto prejemati od njega. Večina starozaveznih prerokov svari pred takim odnosom, nekateri od njih naravo čutijo kot veličino Stvarnika.

Dodatno je ta pristop spodbujen s pridobitniško potrošniško miselnost liberalnega kapitalizma, ki ji narava služi kot poceni vir surovin. Posameznik v proizvodnem procesu je zadosti odtrgan od pristne narave, saj jo uporablja le za rekreacijo (ki je prav tako čisto potrošništvo), da neposredno ne čuti njenega vpliva, niti nima fizično življenjskega stika z njo. Zaradi

problems. The following are some of the most prominent approaches to nature conservation.

3.1 Formalist approach

This conception of nature is based on the search for forms and combinations of forms that appear within it. Formalists do not only focus on macroforms but reach deeper, into the details they later transform into practical or decorative objects, transferring them in a more or less abstract form into dimensions easier on the human eye. In general, the insight is only partial as it remains on the design level and ventures into functionality only when it has previously been recognised by non-formalists and when humans consider this functionality useful.

Typical formalism is also characterised by the assessment of value and hierarchical classification of nature parts. Implementation of the principle of numerical rarity has resulted in the creation of syntheses such as "endangered living beings", whereas the principles of form and aesthetic features have led to the creation of "protected ecosystems", etc. As we can see, this approach increases the value of some objects at the expense of their surrounding structures which are equally important parts of nature although they look rather ordinary, even mediocre. On account of visual deficiencies, these forms "can be sacrificed" in order to prevent uncontrolled visitation. Roads and paths are constructed that are accessible to a modern visitor and infrastructure required for natural monuments is provided.

3.2 Anthroposuperior approach

The idea originates from simplified explanations of Jewish and Greek teachnings upon which the present-day Christian European culture is built. In these teachnings, man is strictly separated from plants and animals, although they are united in nature by a common trait, life. The spiritual difference between man and animals is generalised to extend to the biological level. In reading the Bible, man seems to have ignored God's order to "mind the garden". The words God says to Adam and Eve to"fill the land and subdue it…" do not refer to economical usage of natural resources, but to the use of land in form and extent that puts nature in no risk. Unfortunately, measure and provability are prone to change. Although clearly opposing God's instructions, man dares to commit the original sin. He wants to control and rule everything, make himself equal with God. Man decides to take from God instead of receiving from Him. Most Old Testament prophets warn of such a relationship, and some see in nature the magnificence of the Creator.

The approach is further promoted by the consumer and profit oriented liberal capitalism which uses nature as a cheap source of natural resources. An individual in a production process is separated from pristine nature to an extent that he/she only uses nature for recreation (merely a consumer activity) and feels no direct influence of nature nor has any physical contact with it. Because of his separation from nature, man does not feel the consequences of exploitation, as he constantly chooses

te odtujitve ne čuti posledic izkoriščanja, saj si za stik z njo v sprostitvene namene vedno znova izbira nove, neokrnjene prostore, stare, ki jih je sam omadeževal, pa prepušča kot delno že itak degradirane možnosti nadaljnjega, običajno težko industrijskega izkoriščanja ali uničenja. Antroposuperiorni pristop je pravzaprav tudi vidik nekaterih sodobnih liberalističnih sociooloških in psiholoških šol, ki človeka obravnavajo kot popolnoma neživalskega ali se tej povezanosti vsaj na veliko izogibljejo, s čemer človeško vrsto dvigujejo nad biosfero.

3.3 Tehnicistični pristop

Izvor pristopa, lahko bi rekli bolj metoda pristopa, izhaja iz klasične evropske medicine. Gre za enostavni vzporednici: človek-medicina, narava-varstvo narave. Če sta prvi komponenti v vzporednicah živi, pomeni, da lahko "zbolita", torej je potrebno z določeno akcijo to bodisi preprečiti ali v skrajnem primeru zdraviti. Preprosta aplikacija v naravo metodološko seveda ne zdrži, saj je znanje o ostali živi naravi in njenih procesih neprimerljivo s količino znanja o človeškem telesu. Metode zdravljenja človeka so relativno preizkušene, zato gre medicina s svojimi raziskovalno usmerjenimi sorodnimi znanostmi v iskanje rešitve podaljšanja življenja, s čemer prihaja pogosto v nasprotje celo s svojo lastno humanostjo, ki je na videz presegla biološke danosti človeka.

V tem pristopu gre torej za delovanje, ki s tehniko, kot pridobitvijo sodobnosti, posega v naravno okolje v smislu zdravljenja oziroma popravljanja uničenega. Nekakšen moralni čut, da je vse, kar je človek kruto izkoristil, za vsako ceno treba sanirati. Te sanacije v praksi s strani narave ne pomenijo generalne rešitve, saj gre pogosto le za dislociranje človeku škodljivih ali neuglednih lastnih stranskih proizvodov, pa tudi ekonomskega interesa gradbenih in strojniških strok, ki večinoma predstavljajo tehnicizem v varstvu narave, ni mogoče zakriti. To pomeni, da tehnicisti želijo naravi, predvsem pa čoveku pomagati s tem, da na primer gradijo tehnično kar najbolj dovršene čistilne naprave, ali odpadke kar najbolj učinkovito predelujejo in varno shranjujejo. V ekonomskem smislu zato v njihovem interesu ni zmanjševanje količine odpadkov, kar bi edino lahko razbremenilo naravo.

3.4 Konservatorski pristop

Glavna težnja pristopa je ohranjanje stanja, druga pa iz nje izhaja in jo stopnjuje: vračanje v prvotno stanje. Na prvi pogled sta ti dve aktivnosti pozitivni, toda v svoji pojavnosti sta nastrojeni proti naravi oziroma proti življenju. Največji absurdi v tej smeri se kažejo ob ohranjanju starih dreves ali stanj nekaterih ekosistemov, ki so za naše oči lepši kot prvobitni. Pri vračanju v prvotno stanje se v praksi pogosto pokaže kratkoročnost tega mišljenja - prvotno stanje

new, unspoilt areas for his relaxation and leaves the natural areas he had himself damaged to further, severe industrial exploitation or destruction. The anthopo-superior approach is aslo adopted by certain modern liberalist sociological or phychological schools which regard man as completely separated from animals or avoid admitting any links between man and nature, thus raising human race above the biosphere.

3.3 Technicist approach

The method of the approach derives from classical European medicine. It is based on two simple parallels: man-medicine, nature-nature conservation. If the first components in these two relations are alive, they can also "get sick", and certain actions are required to either prevent or cure such a state. A simple application of this method into nature is understandably not possible in terms of methodology, because knowledge of living nature and its processes is not comparable with the quantity of knowledge on the human body. Besides, the methods for curing people are relatively well-proven, and medicine and its related research-oriented sciences are searching for a solution to prolong life, which occasionally creates a conflict between medicine and its own humanity that has seemingly moved beyond the biological features of man.

This approach is centred on operation, using techniques as a gadget of modern times to intervene with the natural environment in terms of curing or repairing what has been destroyed. It is motivated by a moral sense that everything man has ruthlessly exploited must be restored at any cost. In practice, restoration is not a generally acceptable solution for nature, since it often settles for a mere dislocation of harmful or negative side products of own activities and because it fails to conceal the importance of the economic interest for construction and engineering companies who are the main representatives of the technicist approach in nature conservation. In short, technicists wish to help nature and man by constructing state-of-the-art cleaning devices and by developing highly efficient ways to process and store waste. In the economic sense, their aim is not to reduce the quantity of waste, which is the only way to reduce the pressure on nature.

3.4 Conservationist approach

The main orientation of the approach is to preserve the state of affairs, whereas an additional aim derives from it and upgrades it to include restoration to the original state. At first, the two activities seem positive, but in fact they are against nature and life. The absurdity of the approach is best seen from the efforts to preserve old trees and the state of certain ecosystems which are to our eyes more beautiful than the original ones. In practice, restoration to the original state often shows how short-breathed the method is – the original state is at best measured with historic memory, and quite frequently personal memory is applied. Actually, it often means restoration to the state that is far from the original.

se namreč meri v najboljšem primeru z zgodovinskim spominom, v nekaterih primerih pa kar z osebnim. To pogosto pomeni vračanje na stanje, ki celo ni nujno prvobitno.

Pristop skriva še eno potrošniško usmerjeno miselnost. Tako, kot je ohranjanje in obnavljanje nekaterih stavbnih kulturnih spomenikov ponekod stvar prestiža, tudi vračanje degradirane narave v prvotno stanje z izredno visokimi stroški vzpostavitve in zaradi sedanjega pomanjkljivega znanja še visokih stroškov vzdrževanja, ostaja domena zelo bogatih družb ali posameznikov.

3.5 Sofisticionistični pristop

Znanost se je v zadnjih dveh stoletji ali celo manj tako močno razvila v stroke in specialnosti, da je popolnoma zgubila celostnost. Delno v to celostnost sega le še splošno pedagoški sloj posameznih strok, ki pa je povečini matičnim strokam odmaknjen, prepuščen samemu sebi in pogosto tava več desetletij za ugotovitvami matice. Vzrok takemu stanju je strahotno povečana količina informacij in z avtomatizacijo izredno pospešeno pridobivanje novih. Človeški um te množice novosti ni sposoben niti držati v svoji zavesti, kje šele pretvoriti v novo kvaliteto. V zadnjih desetletjih se razvija nova povezovalna dejavnost, strojna informatika, ki prevzema vsa rutinska dela upravljanja podatkov. S tem je znanstveniku, si seveda obvlada vsebino, dana časovna možnost iskanja novih zaključkov in vračanja k splošnemu. Strojno možganje hkrati lahko omogoča iskanje primerno enostavnejše, popolnonoma in neprilagojeno resnične in tudi splošneje razumevne oblike predstavitve ugotovitev. Seveda je ob tem nujno, da je stroj v službi človeka in ne obratno, kot žal opažamo v praksi.

Z varstvom narave se najintenzivneje ukvarjajo naravoslovne vede, predvsem geološke in biološke, delno kemijske, manj pa bazične fizikalne. Razdrobljene naravoslovne stroke in specialnosti zaenkrat ne najdejo skupnega jezika: že v izrazoslovju prihaja do nasprotij in skrajno različnega razumevanja pojmov. Vsebinske in idejne razlike varstva narave večinoma izvirajo iz premočnega favoriziranja metode v vsaki posamezni stroki, ki zavira spoznanje vsebine kot celote. Konkretno to pomeni, da geolog drugače pojmuje kompleksen objekt v naravi kot na primer biolog ali celo kot njemu mnogo bolj soroden geomorfolog.

Poseben fenomen pri tem pristopu so aplikativne stroke, ki se ukvarjajo z naravo in imajo močan, zgodovinsko pogojen miselni vpliv na javno mnenje. Tako je gozdarstvo, ki močno prednjači, sledijo lovstvo/gojitev divjadi, robolov/robogojstvo in vse vrste kmetijstva. Vse se ukvarjajo z živimi objekti, nekatere celo v njihovem popolnoma naravnem okolju. Vendarle gre pri vseh za ekonomije, ki so

The approach has another commercial side to it. We all know that the conservation and restoration of certain architectural monuments is sometimes a matter of prestige. Similarly, restoration of degraded nature to its original state involves extremely high costs of establishment and maintenance (the latter mainly due to insufficient knowledge) which is why it remains in the domain of rich societies and rich individuals.

3.5 Sophistication approach

Over the last two centuries or even less, science has developed so many disciplines and special areas of expertise that its integral nature has been entirely lost. In part, the integrity of science is preserved in the pedagogical layer of certain disciplines which are, however, separated from original sciences and left to wander in confusion behind the main findings of the scientific discipline. This situation is a result of a terrifying increase in the quantity of information and immediate accesss to new information through automatisation practices. The human mind is not able to store the information in its consciousness, let alone transform it into a new quality. Over the last decades, a new connecting discipline has been developing, called mechanical information science, which has been taking over all the routine tasks of data management. A scientist with a profound knowledge of the content is thus given more time to search for new conclusions and references to generalisations. At the same time, mechanical brains enable a search for such a cognitive form of presentation of findings that is simpler, entirely and utterly true and clearly understandable. It is imperative, however, that the machine works for the man and not the opposite, as is frequently the case in practice.

Nature conservation is most intensively studied by nature sciences, in particular geological and biological sciences, partly chemical sciences and, to a lesser extent, by basic physical sciences. So far, fragmented nature science disciplines and areas of expertise have not found a common language. The differences even appear in terminology, providing users with different interpretations of the same terms. The differences in the content and underlying principles of nature conservation mainly proceed from excessive favouring of a certain discipline method, thus preventing a thorough study of the topic as a whole. As it is, a geologist percieves a complex object in nature in a different way as a biologist or even a geomorphologist.

A special feature of the sophistication approach is applied disciplines which deal with nature and have a strong, historically conditioned influence on public opinion. Applied disciplines range from forestry as the most important field, to hunting/game farming, fishing/fish farming and all agricultural practices. All these disciplines are involved with living organisms, some even with living organisms in their completely natural environment. Primarily, these disciplines are economic branches, and in the past they used to be indifferent to the parts of nature which did not seem to belong to their field of work. It is understandable, however, that the economic branches

bile v preteklosti do tistih delov narave, ki na videz niso posegali v njihov delovni prostor, indiferentna. Popolnoma razumljivo je, da so ravno te gospodarske panoge, ki imajo neposreden stik z živim, prve sprevidile potrebnost drugačnega odnosa do ostale narave. Tu gre seveda zopet za ekonomski pritisk, saj bi nadaljevanje prejšnjih načinov izkoriščanja panogo lahko hitro privedlo v kolaps. Ta ugotovitev in njeno izvajanje dokaj močno prispeva k varovanju prvobitne narave, predvsem življenja v njej, v kolikor ne gre le za prikrito, pogosto imenovano bio ali sonaravno gospodarjenje, ki bi ga kvečjemu lahko primerjali z varovanjem gojene narave. Večkrat se izkaže, da je gospodarjenje sonaravno samo v tolikšni meri, kolikor je to ustrezno trenutni ekonomski naravnanosti.

3.6 Modelistični pristop

Princip modeliranja je izdelati model ali nekakšno enačbo, s pomočjo katere bo možno enake ali podobne pojave relativno enostavno obdelati oziroma iz danih dejanskih ali teoretičnih vhodnih podakov napovedati rezultat.

Model se sestavi iz treh osnovnih modulov. Vhodnega, kamor zberemo kar največ dostopnih podatkov, operativnega, kjer podatke predelujemo in izhodnega, v katerem dokončno oblikujemo rezultat. Model je nujno večkrat preizkušen. Taki modeli so izredno uporabni v konstrukcijskih panogah, fiziki, tehniki in eksperimentalni kemiji, saj so neprimerno cenejši od neposrednih poizkusov, hkrati pa z možnostjo izdelave makete dodatno pokažejo lastnosti obravnavanega objekta.

Taki modeli so seveda priročna metoda tudi v strokah, ki se ukvarjajo z živo naravo, v tem smislu tudi za naravovarstvo. Vendar se tu pojavi osnovni problem - kompleksnost narave. Problem se javlja že pri izoliranih in relativno preprostih fizioloških ali etoloških poskusih v izoliranih laboratorijih, neprimerno pa se stopnjuje pri ekologji neposredno v naravi. Zaradi znanih omejitev strojnih možganov, s katerimi večinoma upravljamo modele, je nemogoče upoštevati vse dejavnike, ki se lahko pojavijo na vhodnih modulih. Prav tako dosedanje znanje ne omogoča učinkovite določitve operandov v centralnem delu, še manj poteka operacije, ki je zaenkrat sestavljena iz veliko več neznank kot je enačb, kar seveda onemogoča že samo postavitev modela.

3.7 Juristični pristop

Večina držav v svetu ima oblikovana pravna orodja, ki varujejo naravo in zaradi katerih povzročitelj prekrška odgovarja pred družbo, ki je pravne norme sprejela. Pravni pristop se zavzema, da se za vse možne prekrške proti naravi uvedejo klavzule, po katerih naj se kršitelj kaznuje.

that are in direct contact with the living nature were also the first to realise the necessity of a different approach to the remaining nature. The movement was spurred by economic pressure, as scientists became aware that continuation of past exploitation practices would quickly lead to the collapse of the discipline. Implementation of this finding has greatly contributed to the conservation of indigenous nature, especially its living components, provided that conservation practices are not just a pretend bio or sustainable management that can at best be classified as protection of cultivated nature. Frequently, management is sustainable only in as far as it suits current economic tendencies.

3.6 Modelling approach

The principle of modelling is to produce a model or an equation which would simplify the processing of identical or similar phenomena and enable people to predict the outcome on the basis of given actual or theoretical input data.

The model consists of three base modules: the input module, where the maximum possible quantity of accessible data are collected, the operation module, where data are processed, and the output module, where the final result is designed. The model should be amply tested. Such models are highly suitable for use in construction, physics, technics and experimental chemistry because they are much less expensive than direct experiments and because they provide a better presentation of an object discussed by producing a mock-up object.

Models are also a useful method in disciplines dealing with living nature, such as nature conservation. Nevertheless, modelling approach is faced with a fundamental issue – the complexity of nature. It arises in isolated and relatively simple physiological or etological tests in isolated laboratories, and intensifies in ecology tests performed in the nature. Owing to the known limitations of the mechanical brain which is commonly used to control models, it is impossible to consider all the factors that can appear in input modules. Similarly, current knowledge does not enable efficient determination of operandi in the central part, let alone the proceedings of the operation containing a much higher number of unknown quantities than equations, which makes creation of the model impossible.

3.7 Juristic approach

Most countries in the world have legal tools for nature protection, which means that a person who commits an offence is liable to the society that has adopted these legal norms. Juristic approach strives for the introduction of rules and regulations covering all potential offences against nature, according to which perpetrators should be punished.

The approach is faced with two major problems. First, there is a legal or procedural delay of which exploiters frequently

Pristop vsebuje dva glavna problema. Prvi je pravna oziroma proceduralna zamuda, ki jo izkoriščevalci običajno izkoristijo za izpolnitev svojih, najpogosteje ekonomsko usmerjenih interesov. Dejanje proti naravi je morda moralno jasno sporno, vendar v pravnem sistemu ni izrecno prepovedano, torej je dovoljeno. Izkaže se, da je v tem smislu dovršenost pravnih sistemov odvisna od celostnega poznavanja problematike varovanja narave in ažurnega spremljanja sprememb, predvsem na novo nastajajočih oblik izkoriščanja. Drugi problem varstva narave pod pravnim pristopom je ta, da je posamezniku kljub zakonu omogočeno uničevanje - seveda s tveganjem kazni. Če je kazen ekonomsko gledano ugodnejša kot z dejanjem pridobljeni profit, se taka kršenja v brezmoralnih krogih lahko redno ponavljajo. Ekonomiji podrejeno naravo torej kljub zakonom lahko uničujemo.

Narava je zatorej verjetno v formalnem in vsebinskem smislu preobsežna za tlačenje v zakone. Pravno vrednotenje zato nujno ne more v zadovoljivi meri ustrezati. Kot taka je nekako hiperjuristična, podobno kot na primer morala ali ustvarjalnost, ki jima pravna znanost ne more niti približno ustrezno slediti.

3.8 Mitologistični pristop

Praktično vsa svetovna ljudstva v preteklosti in še v sedanjosti poznajo božanstva, ki so povezana z naravo, v nekaterih mitologijah v živih bitjih žive duhovna bitja, spet v drugih so sveta sama živa bitja.

Pristop se je razvijal vzporedno z razvojem poganskih religij, večinoma zaradi neznanja: vse, česar z razumom niso mogli doumeti, so uvrstili v nadnaravno sfero. Institucionalno se te vrste mitologij v večjem obsegu ohranjajo med arhaičnimi ljudstvi osrednje in južne Azije, v Evropskem kulturnem prostoru so jih v religioznem pogledu nadomestile bolj racionalno kompleksne vere. Predvsem na podeželju je kljub temu ostala množica vraž, urokov in ostankov poganskih praznovanj, povezanih z dogodki ali bitji v naravi. V mestnih okoljih se take primitivne oblike poganstva v glavnem ne pojavljajo, pač pa je dokaj moderno ukvarjanje z tako imenovanimi nadnaravnimi pojavi (vkolikor so to sploh nadnaravni) kot so telepatija, bioenergija raznih sevanj in podobno, ki prav tako vzbujajo strah pred neznanim.

Pri takih pogledih se človek nekako izloči iz narave, ki zanj predstavlja silo, ki je s svojim umom in sredstvi ne obvladuje. Parcialno gledano je taka narava s tem pasivno varovana, večinoma pa gre za dislocirano izkoriščanje. Mitologiziran človek v strahu pred naravnimi dogodki dovoljuje drugače mislečim, da mu iz narave prinašajo dobrine.

Neke vrste mitologijo kaže tudi vegetarjanstvo v Vzhodni Aziji, ki selektivno varuje živali, ki so primerne za prehrano. V Evropo se mit prenaša kot okleščena,

take advantage in pursuit of their interests of economic nature. From the moral standpoint, an act against nature may clearly be contentious, but if is not explicitly prohibited by law, it is considered allowed. In this respect, perfection of judicial systems depends on the holistic knowledge of nature conservation issues and on keeping up to date with recent changes, in particular with regard to the emerging forms of exploitation. Another nature conservation problem seen from the standpoint of judicial approach is that despite the law, an individual can still destroy nature – at the risk of being punished, of course. If the punishment is lower in economic terms than the profit obtained through the act, such violations may continue in 'moral-free' circles. Nature, subordinated to economy, can thus be destroyed despite legal protection.

In terms of form and content, nature is probably too extensive to be squeezed into the law. And that is why legal evaluations can not be satisfactory. As such, nature is hyper-juristic, much like morals or creativity which are impossible to encompass or comprehend by the judicial science.

3.8 Mythological approach

In the past and even today, all world nations have cherished their own mythological beings connected with nature. In some mythologies, spiritual beings inhabit living beings, and in other mythologies living beings themselves are considered holy.

This approach has been developing in line with pagan religions, mostly because of ignorance: everything that could not be explained through reason was classified as belonging to the supernatural world. Institutionally, these religions are organised on a large scale among archaic nations of the Central and East Asia, whereas they have been replaced by rationally more complex religions in the European cultural space. Nevertheless, many superstitious beliefs, spells and remnants of pagan festivities, linked to either natural phenomena or creatures in nature, have lingered to the present day, especially in rural areas. In urban areas, primitive forms of paganism are of rare occurrence. Studies and practice of supernatural phenomena (if supernatural at all) such as telepaty, bioenergy of various forms of radiation and similar practices that promote fear of the unknown have come to enjoy high popularity.

In a way, these practices exclude man from nature which to him represents a force he can not control with his mind and means. Nature is partly and passively protected, but in most cases this nature protection is actually a dislocated exploitation. A person who is inspired by mythology and in fear of natural phenomena allows others to supply him with goods from nature.

Some form of mythology is also present in the vegetarianism in Eastern Asia, which selectively protects animals fit for food. The myth is transferred to Europe as a commercially-oriented, extravagant activity which is devoid of its true meaning and can rarely be considered a spiritual value of man.

potrošniško in v ekstravaganco naravnana in manj kot duhovna vrlina človeka.

3.9 Pristop primitivizma

Za razliko od ostalih, ki so se pojavili vzporedno ali znotraj razvoja družb sedaj prevladujočih civilizacij, se je ta pristop razvijal v prazgodovini učlovečevanja. Z današnjim jezikom bi ga bolje označili kot ostanek preteklosti, saj se danes v polnosti pojavlja le še med izoliranimi ljudstvi osrednje Afrike, Južne Amerike in Tihomorskih otočij. Zaradi njihovega nepotrošniškega načina življenja in nujnega vklapljanja njihove kulture v naravne procese, to naravo varujejo, ker se zavedajo neposredne kratkoročne življenjske odvisnosti od nje.

Teh "divjakov" človek gospodarsko prevladujočih svetovnih civilizacij, ki se iz narave organsko izloča, ne smatra za sebi enakovredno raso, ampak gleda nanje kot na polživalsko bitje potrebno inkulturacije. Z velikopoteznim misionarjenjem, ki je pri velikih narodih vedno imelo ekonomsko ozadje, je izničena prenekatera taka kultura. V sedanji prevladujoči nesuženjski obliki medčloveških odnosov se ohranjajo le drobci tega pristopa, in sicer le v primeru, če je primitivno ljudstvo zadosti veliko za biološko oziroma genetsko kontinuiteto, če je zadosti majhno, da za zahodnjaka ni ekonomsko zanimivo in če njihova okolica ne vsebuje surovin hitrega zaslužka. Nekatere smeri tega pristopa so se zlasti v osrednji in jugovzhodni Aziji razvile v pobožanstvenje narave v Evropi pa v panteizem – seveda preko filozofskih utemeljitev.

V zahodnem svetu je ostanek takega gledanja na naravo oziroma neke vrste poganstvo značilno za nerazvite predele, kjer se ljudje ekstenzivno ukvarjajo s kmetijstvom. Za ohranitev so v teh primerih morali biti dani posebni pogoji, med katerimi so najvažnejši, da se mitologija narave ni razvila v premočno poosebljanje božanstev, da človek množice neznank v naravi ni takoj pobožanstvil, ampak da je v njem ostal zdrav raziskovalni duh, ki neznano neintitucionalno spoštuje kot življenjsko danost in ki je za normalno preživetje morda sploh ni potrebno razložiti. Taka miselnost sama v sebi omogoča izredno učinkovito varovanje narave in dovoljuje samo smiselno izrabo za človekovo nepotrošno življenje. Pristop je našel tudi presenetljivo skladje s praktičnim novozaveznim krščanstvom.

3.10 Sukcesionistični pristop

Kot nasprotje formalizmu in drugim antropocentrizmom se v sodobnem varstvu narave pojavlja sukcesionizem. Temeljna misel, ki jo pristop postavlja za pravilno je, da mora človek naravi pustiti vse procese, kar ob sedanji močni degradaciji posebej velja za sanacijske: vse vrste renaturacije je narava sama sposobna najbolje

3.9 Primitivist approach

Unlike other approaches which appeared parallel to or within the developing societies of dominant civilisations, primitivist approach developed in the ancient history of mankind. In the language of today, the approach would best be described as a remnant of the past since it is preserved today in its entirety only among the isolated nations of Central Africa, South America and the Pacific Islands. Uncommercialised way of life and necessary integration of culture into natural processes have made these nations aware of their direct and imminent dependancy upon nature and motivated them to protect it.

The people of economically powerful world civilisations, who have organically separated themselves from nature, do not regard these "savages" an their equals. They treat them as semi-animals in need of inculturation. Numerous cultures were destroyed through large-scale missionary activities which have in large nations always been closely linked to economic interests.

In the non-slave relationship among humans, which prevails in the modern society, only bits and pieces of the primitivist approach are preserved, namely in determining whether a primitive nation is sufficiently big to have a biological or genetic continuity, or whether it is either small enough not to attract any economic interest of the western world or its surrounding areas do not contain any sources of fast income.

In certain geographical variations of the approach, mainly in Central and South-East Asia, godly features are attributed to nature. Supported with philosophical justifications, they developed into panteism in Europe.

In the western world, such a perception of nature or a type of paganism is typical of undeveloped areas where people are actively involved in agriculture. The primitivist approach was only able to survive in special conditions, the most important being that the mythology of nature did not develop into an over-personification of gods, that man did not create gods for every unknown natural phenomenon, but maintained a healthy curious spirit which treated the unknown as a fact of life that did not necessarily require thorough explanations and understanding in order to enable normal survival. Such thinking in itself provides for a highly efficient form of nature protection and only permits sustainable uses of nature for uncommercialised life. The approach is in surprising harmony with practical New Testament Christianity.

3.10 Succession approach

Successionism has developed in the modern nature conservation science as a counterpart to formalism and other forms of anthropocentrism. The main thought the approach supports is that man must let nature carry out all its processes, including restoration of degraded nature. The nature can best implement all restoration activities. Successionists have separated themselves from the time dimension of a human life and from the subjectiveness of

izvesti. Sukcesionisti so se nekako odtrgali od časovne dimenzije človekovega življenja in subjektivnosti človekovega gledanja in jih zato ne moti, če je del narave dalj časa prizadet - v očeh formalistov neurejen - ne glede na povzročitelja: naravno katastrofo ali človekov poseg.

Druga tema sukcesionistov je brezpogojno sprejemanje življenja kot rojstva, življenja v ožjem pomenu in smrti, gledano s stališča osebka, vrste ali ekosistema. Bistvena razlika od ostalih pristopov je dopuščanje smrti ali z drugimi besedami, ne trudi se za umetno podaljševanje življenja.

Sukcesionistični pristop je kratkoročno gledano izredno krut in celo nesmiselen. Pravi, celo ekonomsko upravičen pomen pokaže šele v daljših razdobjih. Upravičenost takega ravnanja utemeljuje z evolucijskimi dejstvi, po katerih narava vsak element, ki ga razvije, v primeru močne neskladnosti, izloči. Človek se je sicer že sam izločil iz biosfere, vendar pa le zavestna izločitev elementa samega ne pomeni tudi resnične izločitve iz narave: pomislimo le na dejstvo, da se človek miselno izogiblje velikimu delu narave, ki je tudi njegov regulator, to so patološki mikroorganizmi. V tem smislu je verjetno trenutno najbolj ogrožena prav "najbolj napredna" bela rasa, ki je v povprečju z biološkega in tudi praktično življenjskega vidika najmanj vitalna.

Problem sukcesionizma je vklopitev sodobnega človeka v sodobno naravo. Načelno je to nemogoče, predstavniki pa zagovarjajo mišljenje o nujni spreobrnitvi človeka oziroma človeštva k nepotrošnemu načinu življenja in ne k spreminjanju narave pod lažnim nazivom popravljanja pokvarjenega. V tem smislu priznava človeka kot del narave le, če zavestno izrablja naravo izključno za svoje materialno in duhovno preživetje. V vseh drugih primerih, ko je cilj izkoriščanja dobiček (višek), je človek naravi vedno nasproten, posebno nasproten ji je v primerih prikritega izkoriščanja dobrin, ki se pogosto skriva celo pod imenom varstvo narave.

4 Problemi nekaterih pristopov k varstvu narave

Glavni problem opisanih pristopov je, da do narave ne pristopajo celostno, da jim manjkajo posamezni ključni elementi ali pa so v njihovih pristopih ti elementi nepovezani. Mitologizem in primitivizem še imata na videz morda nekaj možnosti, da se razvijeta v zdravo in učinkovito varstvo narave v tretjem svetu, vendar je spričo globalizacije to vedno bolj vprašljivo. Shema predstavlja poskus razporeditve pristopov na logično piramido dejavnega naravovarstva. Trdim, da je piramida s tako razporejenimi splošnimi dejavnostmi, daje izjemno velika zagotovila za uspeh. Značilno za razvoj varstva narave v svetu in z zamudo tudi v Sloveniji pa je žal malo obrnjena piramida: v začetku razvoja stroke so bile dejansko najbolj pomembne

man's standpoint and do not feel the need to intervene if a part of nature is affected - formalists would say, unregulated - for some time, regardless what the cause of the impact is: a natural disaster or a human action.

The other belief successionists share is an unconditional acceptance of the notion of life as birth, life in its narrow sense, and death, of an individual, a species or an ecosystem. What sets this approach apart from other approaches is that it permits death or, in other words, does not strive to artificially prolong life.

The successionist approach is extemely cruel and even absurd in its short-term efforts. Its economically justified role only becomes evident in long periods. Evolution is used to justify the existence of the successionist approach because each element that develops in nature is also eliminated from it in case of severe non-conformity. Man has already separated himself from the biosphere, but a conscious separation of an element from nature does not actually mean its exclusion from nature: we only need to remember that man has been trying to avoid pathological micoorganisms, which actually represent a large part of nature. In this respect, the "most advanced", white race is currently most at risk, being least vital from the biological and practical standpoints.

The problem of successionism is how to integrate a modern human being into modern nature. In principle, this is impossible, but successionists promote the idea of the urgent reformation of man and mankind towards the uncommercial way of life and away from the actions that alter nature under the false pretences of repairing something broken. In this sense, successionism only recognises man as a part of nature if he consciously uses nature for its material and spiritual survival. Whenever the goal of human exploitation is profit (yield), man is in opposition to nature, and this opposition is particularly notable in cases of resource exploitation hiding behind the term nature conservation.

4 Problems related to certain nature conservation approaches

The main problem of the approaches described is the absence of a holistic approach to nature. They either lack certain key elements or these are not connected into a coherent whole. The mythological approach and primitivism seem to have some opportunities to develop into healthy and efficient nature protection practices in the third world, but globalisation makes such a development more and more questionable. The diagram shows an attempt to present various approaches in a logical pyramid of active nature conservation practices. I firmly believe that success would be guaranteed if general nature conservation activities were distributed as presented in the pyramid. Unfortunately, nature conservation tendencies in the world and in Slovenia remsemble a reverse pyramid: at the begining of nature conservation development, most attention was paid to activities based on intuitive judgement. It was followed by mass collection of data in forms of lists and records, but with weak analyses and intuitive evaluation. Only later,

akcije, ki so temeljile na intuitivnih presojah. Sledilo je množično zbiranje podatkov v obliki seznamov, kartotek – vendar s šibko analizo in intuitivnim vrednotenjem. Šele rezultati analiz in iz njih izhajajoče poglobljeno vrednotenje je prineslo naravovarstveno informacijo. Kveliteta je seveda odvisna od izvornih podatkov in obvladovanja analiz.

Ti trije segmenti, torej podatki, informacije in akcije prispevajo odgovore na vprašanja: KAJ? in KAKO?. Ostaja pa nam bistveno vprašanje: ČEMU?

analysis results and deep evaluations based on these results produced nature conservation information. The quality of information, however, depends on original data and analysis management.

And these three segments - data, information and action - make up the answers to the questions WHAT? and HOW? The fundamental question remains: WHY?

Shema: Logična piramida dejavnega naravovarstva z okvirno opredelitvijo posameznih pristopov. / Diagram: Logical pyramid of active nature conservation practices and tentative approach definitions

5 Pristop k vprašanju ČEMU

Trdim, da je najprej treba zgraditi trdno duhovno podlago. In sicer v nas samih, posameznikih, in v celotni stroki. Za prvo, individualno, praktično ni nasveta – vsak ga mora najti sam. Za stroko pa se je zadeve treba lotiti načrtno. Torej, zgraditi moramo filozofijo varstva narave.

Če se zdaj vrnemo na kratek pregled in štiri postaje filozofije narave v začetku prispevka, se pravzaprav z veseljem ozremo na četrto časovno točko: sedanje filozofije narave se dejansko približujejo varstvu narave in se pravzaprav ponujajo, da jih uporabimo za temelj. Filozofija, ki naj bi služila kot temelj mora biti taka, da je na njej mogoče zgraditi celotno etiko varstva narave. Zato mora zadostiti dvema pogojema. Prvič, razložiti mora, kako je človekov odnos do narave pripeljal svet do nivoja krize, s katero se danes soočamo. Drugič, pokazati mora, kako človekov odnos do narave lahko postane pozitiven. Pozitiven odnos pomeni najprej spoštovanje do narave. Ali naravovarstveniki spoštujemo naravo? Spoštujemo dejansko in v resnici? Jo sploh zadosti poznamo, da bi jo lahko spoštovali – oziroma jo dojemamo v njeni kompleksnosti?

5 Approach to the question WHY

I believe we first need to build a solid spiritual basis. In ourselves, individuals, and in the entire science. As regards individual spiritual basis, there is no advice. One must find it alone. As regards science, however, careful planning is needed. A philosophy of nature conservation must be developed.

If we return to the quick overview of the four stages in the philosophy of nature at the beginning of this paper, we can be quite pleased to find out that the fourth stage, modern philosophy of nature, is actually drawing closer to nature conservation. Any philosophy to be used as the spiritual basis needs to be suitable and stable enough for the entire ethics of nature conservation to be built on it. It should therefore meet two conditions. Firstly, it must explain how the man's relation to nature has led the world to the environmental crisis which we face today. Secondly, it shall show how a man's relation to nature can become more positive. Positive attitude is first and foremost about respect for nature. Do we, nature conservationists, respect nature? Do we really sincerely respect it? Do we know nature enough to respect it, do we comprehend it in all its complexity?

5.1 Primer interkulturnega pristopa

Zanimive rešitve je nakazal singapurski filozof Alvin Lim. Iz angleških, pravzaprav ameriško zaznamovanih prevodov nemškega juda Martina Bubra je zasnoval jasno podobo temelja filozofije narave, ki naj usmerja človekov odnos do narave. Nedvomno Buber ne sodi med najtežje razumljive nemško pišoče filozofe, pa tudi njegove razlage odnosov med osebami so izjemno čiste, nekako univerzalne. Vendar je za vzhodnjaka moral biti ta miselni preskok kar velik. Po drugi strani si Evropejci pravzaprav ne moremo do potankosti predstavljati vzhodnjaškega odnosa do narave. Sistem, ki temelji na njihovi tisočletni kulturi, je bistveno drugačen. K nam prihajajo večinoma nepristne oblike, ki prinašajo tisto, kar družbi naše kulturne sredine ustreza. Zaradi svoje zanimivosti in prodornosti večinoma v celoti tudi zameglijo originalno filozofijo in duhovnost, hkrati pa se tudi vzhodnjaki vse bolj sekularizirajo spričo močnih globalizacijskih vplivov. Lim pa je združil kulture in ustvaril interkulturni pristop, ki lahko postane kvalitetna duhovna podlaga varstvu narave.

Martin Buber v svoji filozofiji dialoga razpravlja o odnosih, ki se dogajajo med osebo (jazom) in bližnjim. Bližnji je v našem primeru lahko katerokoli bitje razen mene. V delu Odgovori na kritike, Buber pravi:

"Izhajam iz preproste situacije: Dva človeka se zavzeto in odkrito pogovarjata. Poglejmo si nekatera dejstva take situacije, v kateri nam običajne kategorije ne zadostujejo. Pravzaprav bomo zelo hitro razpoznali fizično prisotnost dveh oseb, ki si izmenjujeta misli z besedami in kretnjami in tudi duševnost, ki se dogaja v njuni notranjosti. Vendar pa bo dialog, ki poteka med dvema človekoma, in v katerega se vpletajo vidna in zvočna dogajanja, ki hkrati izvira iz duševnosti obeh sogovornikov in je tudi odsev njunih notranjosti – v svojem pomenskem bistvu sam dialog ostane pogosto neopažen. Kakšen pomen ima, kam naj ga uvrstimo?"

Na njegovo filozofijo dialoga lahko gledamo kot na presojanje odnosov, ki so možni med osebo in bližnjim: Odnos jaz-ono in odnos jaz-ti.

Bubrova filozofija dialoga obravnava osebo kot razlagalca (hermenevtično), ker je vrsta odnosa, ki se pojavlja med osebo in bližnjim, odvisna od tega, kako si prav ta oseba razloži bližnjega. Če oseba gleda na bližnjega kot na ono, bo med njim nastal odnos jaz-ono. Če oseba pristopa do bližnjega kot do tija, nastane odnos jaz-ti. Ta hermenevtika je v delu "Oddaljenost in odnos" razdelana v smislu, ki ga Buber poimenuje "dvostopenjsko nagibanje": Najprej vzpostavitev distance, potem vstopanje v odnos. Osnovno vzpostavitev distance (diafore) osebi pomeni raz-ločiti se od bitja, ki ni ona sama. Gre za premik, v katerem oseba določi bližnjega za bližnjega. Šele ta raz-ločitev omogoča osebi, da vstopa v odnos.

5.1 Intercultural approach

Alvin Lim, a philosopher from Singapore, has shown some interesting solutions. His basis for the philosophy of nature which is to regulate and direct human attitute to nature is based on the English (or, better, American) translations of the works by a German Jew Martin Buber. Buber's works are definitely not among those philosophical works that are difficult to comprehend, and his explanations of interpersonal relations are exceptionally clear, even universal. But for an Easterner, this must have been some mind jump. On the other hand, Europeans cannot fully understand the Eastern relation to nature. That system, based on a thousand-year culture, is significantly different from ours. Usually, we are confronted with unoriginal forms which only emphasize the elements that suit the society of our cultural environment. They are attractive and intriguing enough to blur the original philosophy and spirituality, and the Easterners are becoming more secularised in the light of strong globalisation influences. Lim, however, has brought together cultures and created an intercultural appropach that can develop into a quality spiritual basis for nature conservation.

Buber's philosophy of the dialogue studies the relationships which can hold between the self and the other. The other is interpreted as any being which is not identical with the self. In his work Replies to my critics, Buber says:

"I proceed from a simple real situation: Two men are engrossed in a genuine dialogue. I want to appraise the facts of this situation. It turns out that the customary categories do not suffice for it. I mark: first the 'physical' phenomena of the two speaking and gesturing men, second the 'psychic' phenomena of it, what goes on 'in them'. But the meaningful dialogue itself that proceeds between the two men and into which the acoustic and optical events fit, the dialogue that arises out of the souls and is reflected in them, this remains unregistered. What is its nature, what is its place?"

Buber's philosophy of dialogue hence can be viewed as an account of relationships which can exist between the self and the other: the I-It and the I-Thou relationships.

Buber's philosophy of dialogue views the self as a hermeneutic agent, for the type of relationship that occurs between the self and the other depends on how the self interprets the other. If the self interprets the other as an It, the relationship between the self and and the other will be the I-It relationship. If the self interprets the other as a Thou, the relationship between the self and the other will be an I-Thou relationship.In 'Distance and Relation' this hermeneutic act is analysed in terms of what Buber describes as a 'twofold movement'. 'Primal setting at a distance' is followed by 'entering into relation'.The primal setting at a distance involves the self setting itself apart from the being which is not the self. This is the movement where the self identifies the other as the other. Identifying the other as the other allows a person to enter into a relation with it.

Katera je temeljna razlika med držama jaz-ono in jaz-ti? Odgovor najdemo v razlagi, kako si oseba razlaga bližnjega. Pri drži jaz-ono oseba bližnjemu ne priznava nobenih drugih zmožnosti kot le te, ki mu jih zanj sama določi. Hermenevtično gledano, osebo v tem primeru lahko razumemo kot da v sebi zgradi podobo bližnjega in mu potem to podobo na nek način vsili. Bližnjega ne tolmači kot objekt, ki bi imel še kakšne druge, njemu lastne zmožnosti. Zato gre pri drži jaz-ono za odnos do podobe bližnjega in ne do njegovega pravega bistva. Na drugi strani pa v drži jaz-ti oseba bližnjemu priznava njemu lastne zmožnosti, ki so lahko tudi drugačne od teh, ki mu jih sicer sama vsili ali jih od njega pričakuje. Oseba v tem primeru spoštuje drugačnost bližnjega.

Pri varstvu narave opazimo nakej podobnega v odnosu , opisanem v zgornji situaciji dveh ljudi: človeka smo sposobni definirati, naravo tudi nekako (podatki, naravovarstvena informacija), ustavi pa se nam pri odnosu, dialogu. Če smo zdaj to medčloveški odnos prenesli na odnos človek – narava (tudi Buber sam na nekaj mestih v svojih spisih tak odnos omenja), gre za to, da človek najprej ustvari in prizna distanco med seboj, torej med osebo, jazom in naravo. Poistovetenje ali celo zlitje z naravo torej ne vodi k pravemu odnosu. Šele ko je distanca ustvarjena, je možno vzpostaviti odnos, ki pa ne sme biti v smislu jaz-ono, torej brezoseben odnos do nečesa tretjega, zame nepomembnega, ampak pristen odnos z dejstvi, ki jih narava kot taka sama nudi. Tu ne gre za odnos do takšne narave, kakršno si jaz kot oseba ali mi kot naravovarstveniki predstavljamo, ampak za odnos do narave takšne kot ta je.

To je le en primer možne podlage za filozofijo varstva narave, v literaturi bi jih našli še več.

6 Sklep

Filozofske razprave so naravovarstvu dokaj tuje. Tuje in dolgočasne so tudi mnogim znanstvenikom. Prvi in drugi hočemo ali hočejo biti stvarni, recimo realni. Naj torej še sam postanem "realen".

Ob trenutno potekajočem projektu Šotna barja v TNP se postavljajo mnoga filozofsko-etična vprašanja, ki izhajajo iz čisto praktičnih problemov.

Osnovni je: Čemu varovati nikomur koristna močvirja sredi poljuških gozdov? Kaj ima človek od njih? Ne gre za pitno vodo, kakšne strašne estetike tudi ni, rezanje šote je ob tako majhnih površinah skrajno nerentabilno. Znanstveni pomen? Da, vendar le za peščico ljudi. Takšno razmišljanje kaj hitro privede naravovarstvenika v strokovno in tudi osebno stisko. Zaveda se, da je tisti del narave nekaj vreden, začel je vzpostavljati odnos z vrednoto, vendar se je ustavil pri podatkih, morda informaciji. In kaj zdaj s tem družbeno koristnega početi? Če nimamo v sebi osebnega

What is the fundamental difference between the I-It and the I-Thou attitudes? The answer lies with how the self interprets the other. In the I-It attitude, the self does not interpret the other as having any possibilities beyond those which the self has determined for it. In hermeneutic terms, the self can be understood as constructing an image of the other and then imposes this image on the other in some way. The other is thus not recognised as having any other possibilities of its own. Hence in the I-It attitude, the self relates to its image of the other instead of the other. On the other hand, in the I-Thou attitude the self recognises that the other has possibilities of its own beyond those which the self expects or imposes. The self respects the otherness of the other.

Nature conservation resembles the above described situation of two people and their relationship: we are able to define a person, and we are somehow able to define Nature (data, nature conservation information), but we remain helpless when it comes to the relationship, the dialogue. If this interpersonal relationship is now applied to the Man-Nature relationship (Buber himself mentions such a relationship in his works), man first has to set and admit a distance between the self and the nature. Identification with nature or even becoming one with nature does not lead to a proper relationship. Only after a distance has been created, we can form a relationship which cannot be an I-It relationship, that is an impersonal relationship to something irrelevant, but a real relationship with facts that nature can itself provide. It is not about a relationship to Nature as me, a person, or we, nature conservationists, imagine, but a relationship to Nature as it is.

This is just a potential basis for the philosophy of nature conservation.

6 Conclusion

Philosophic treaties are not common in nature conservation. Even many scientists consider them strange and dull. But nature conservationists and scientists all want to be sensible. So let me be sensible and 'real'.

The current project "Peatbogs in Triglav National Park" sets many philosophical and ethical questions which all proceed from practical issues.

The main question is: Why should the wetlands lying amidst Pokljuka forests be protected? They are not any good for anybody. What benefit can humankind derive from them? It is not about the drinking water, nor some outstanding beauty, and cutting peat is unprofitable in so small areas. Scientific value? Yes, but just for a handful of people. Such thinking can bring a nature conservationist into a professional and personal crisis. He or she is aware of the value of that part of nature, he has started to establish a relationship with this natural feature, and still he stopped in the data-collection phase. How can society benefit from this natural feature? If conservationists have no personal foundation, or if the science has no common foundation, its philosophy, it frequently happens that professional nature conservationists prepare the

temelja, oziroma če stroka kot celota nima skupnega temelja, skupne filozofije, se običajno zgodi, da smo poklicni naravovarstveniki ustvarili podlage za turistične vodnike: naravne fenomene, za katere ne moremo niti razumeti, niti doumeti njihove uporabnosti, umestimo med turistično zanimive objekte. Naravi dejansko vsilimo lastnosti, ki so uokvirjene v naše dojemanje. Javno mnenje je sicer trenutno naklonjeno varovanju, toda veliko vprašanje je, ali je ta naklonjenost posledica notranjega odnosa do teh naravnih fenomenov, ali pa morda zgolj razultat popolne neuporabnosti močvirij za človekove potrebe.

Naravovarstvo mora nujno zgraditi filozofijo naravovarstva.

groundwork for tourist guides and classify natural phenomena whose usability they cannot understand nor comprehend as tourist attractions. We force upon nature the features that are embedded in our thoughts and perceptions. Currently, public opinion is in favour of nature conservation, but we should ask ourselves whether this support stems from our inner relations towards these natural phenomena, or simply from the fact that wetlands are completely useless for human needs.

Nature conservation must develop a nature conservation philosophy.

Alenka GABERŠČIK

MOKRIŠČA IN NJIHOVA VLOGA V POKRAJINI

Wetlands and their role in the landscape

Beseda mokrišča združuje različne habitate, v katerih igra odločilno vlogo vodni režim, ki vpliva na njihovo produktivnost in vlogo v pokrajini. V mokriščih potekajo številni procesi, ki so neobhodno potrebni za vzdrževanje kakovostnega okolja. Ne glede na stopnjo produktivnosti so mokrišča zelo ranljiva, predvsem zaradi vplivov, ki jih povzroča človek. Mokrišča ogrožajo spremembe vodnega režima, pridobivanje površin za kmetovenje, naselja in gradnjo infrastrukture (ceste), vdori tujerodnih rastlin, paša in teptanje ter globalne spremembe.

The word wetland comprises a variety of habitats characterized by specific water regimes that influence their productivity and the role in the landscape. They support high diversity of organisms colonizing the variety of habitats. Many life support functions take place in wetlands. Regardless the production rate they are very vulnerable due to human impacts and natural stresses. The physical threats are the following: changes of water regime, acquisition for agricultural land, urbanisation and building of infrastructure (roads), invasion of alien plant species, grazing and trampling by animals and global changes.

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1. Uvod

Beseda mokrišče združuje niz habitatov, ki imajo več skupnih lastnosti; najpomembnejša med njimi je prisotnost vode. Mokriščne površine so stalno, sezonsko ali občasno poplavljene ali pa le nasičene z vodo. Čeprav pokrivajo le 6 % kopnine, jih najdemo v vseh klimatskih območjih od tropov do tundre (Owen in sod., 1998). Zavedanje pomena mokrišč je vedno večje, njihove površine pa se vedno bolj krčijo. Ocenjujejo, da je bilo do leta 1985 na svetu izsušenih kar 1,6 miljonov km^2 mokrišč (Park, 2001). Samo v Evropi je bilo v prejšnjem stoletju in pol uničenih polovico vseh površin mokrišč. Poleg tega pa se je zaradi prekomernega vnosa hranil v vodna telesa v Evropi pojavil tudi sindrom "propadanja trstiščnih mokrišč" (Čižkova in sod, 1996). Mokrišča smo izsuševali tudi v Sloveniji. Nekaj stoletij nazaj je bila večina dolin zamočvirjena. Danes so vodotoki stisnjeni v strugo, ob njih pa se raztezajo naselja ali njive. Spreminjali pa smo tudi večje površine: na primer poplavne ravnice rek, kraška polja in Ljubljansko barje. Izgube, ki so zaradi izsuševanja mokrišč nastale, so nenadomestljive, saj so raziskave pokazale, da so mokrišča dragoceni deli narave, v katerih se odvijajo številni pomembni procesi, ki odločilno vplivajo na razmere v pokrajini (Joergensen, 1990; Wetzel, 1990; Boulton in Brock, 1999; Gaberščik in Urbanc-Berčič, 2001).

2. Kaj opredeljuje mokrišča?

Primarno vlogo v mokriščih ima vodni režim, ki je zelo raznolik in pogojuje življenjsko združbo in procese. Glavne spremenljivke vodnega režima so pojavljanje vode, frekvenca in trajanje poplavljenja, obseg poplav ter globina vode (Tabela 2.1). Pomembne so tudi fizikalne, kemijske (vsebnost hranil in soli) in biološke lastnosti vode.

Definicij mokrišč je prav toliko, kot piscev, ki o njih pišejo. Zelo široko opredeljujeta mokrišča Boulton in Brock-ova (1999). Takole pravita: »Mokrišče je vsako območje, kjer so tla stalno ali občasno nasičena z vodo ali poplavljena, naravno ali umetno, s tekočo ali stoječo vodo, slano, somornico ali sladko in kjer poplavljenje vpliva na življenjsko združbo in ekološke procese.« Še širša je definicija v Ramsarski konvenciji, ki opredeljuje mokrišča kot območja močvirij, nizkih barij, šotišč ali proste vode, naravnega ali umetnega nastanka, stalna ali občasna, s tekočo ali stoječo vodo, sladko, brakično (somornico) ali slano, vključno z območji morske vode, katere globina med oseko ne presega šest metrov. Bolj funkcionalno pa definira mokrišča ameriška Agencija za zaščito okolja (EPA), ki pravi da so to območja poplavljena ali nasičena s

1. Introduction

The term wetland comprises a group of habitats which share a number of common features, the most important being the presence of water. Wetland surfaces are permanently, seasonally or periodically flooded or saturated with water. Although spreading over just 6 % of land surface, wetlands can be found in all climates ranging from the tropics to the thundra (Owen et al., 1998). Awareness of wetland values is growing. Wetland areas, however, are shrinking. It is estimated that by 1985 approximately 1.6 million km^2 of wetlands had been drained (Park, 2001). In the 20th century, half of all wetland areas in Europe were destroyed. Moreover, excess nutrient input in the water bodies gave rise to the syndrome of "reed decline" in Europe (Čižkova et al., 1996). Draining of wetlands was also practised in Slovenia. Centuries ago, the majority of valleys were moors. Today, watercourses are squeezed into their beds, with settlements and fields stretching along their banks. Large areas such as river floodplains, karst fields and Ljubljansko barje (Ljubljana Moor) have also been modified. The losses caused by wetland drainage are irreparable as research shows that wetlands are valuable parts of nature where numerous important processes take place that have a decisive influence upon the conditions in the landscape (Joergensen, 1990; Wetzel, 1990; Boulton and Brock, 1999; Gaberščik and Urbanc-Berčič, 2001).

2. What defines a wetland?

Wetlands are characterised by a special water regime which is highly diverse and defines plant and animal associations and processes in the wetland. The main variables in the water regime are fluctuations in water presence, frequency and duration of flooding, range of floods and depth of water (table 2.1). Physical, chemical (content of nutrients and salt) and biological characteristics of water are also important.

There are as many definitions of wetlands as there are authors writing about wetlands. Boulton and Brock's (1999) definition of a wetland is rather wide. They say that "wetland is any area of temporarily or permanently waterlogged or inundated land, whether natural or artificial; it includes water that is standing or running, fresh, brackish or saline, which has an influence on the biota and ecological processes occurring at any time." The definition of wetlands used for the purpose of the Ramsar Convention is even wider, classifying wetlands as areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres. More functional is the definition by the US Environmental Protection Agency which defines wetlands as those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do

površinsko ali talno vodo, ki glede na pogostost in trajanje omogoča prevlado rastlinam, prilagojenim na z vodo nasičena tla. Ta definicija izpostavlja

support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas. This definition

značilnosti / characteristics	opredelitev / definition
pojavljanje vode / water presence	kdaj je voda prisotna (sezonsko, občasno) / when water is present (seasonal, sporadic presence)
frekvenca / frequency	pogostost polnjenja in praznenja (od 0–stalna vodna površina, do večkrat letno) / frequency of filling and emptying (from 0–permanent water surface to more times per year)
trajanje / duration	čas poplavljenja (od nekaj dni do nekaj let) / time of flooding (from several days to several years)
obseg poplav in globina vode / range of flood and depth of water	poplavljena površina in največja globina / total flooded surface and maximum depth
spremenljivost / variability	spremenljivost paramerov v času / variability of parameters in time

Tabela 2.1 Značilnosti vodnega režima mokrišč (po Boulton-u in Brock-ovi, 1999)

Table 2.1 Characteristics of wetland water regime (Boulton & Brock, 1999)

vlogo vegetacije, ki je nosilec pomembnih procesov v mokriščih. Pestrost mokrišč izražajo tudi ljudska poimenovanja kot so: blata, čreta, log, ločje, trsje, mlaka, močvara,…

3. Vloga mokrišč v pokrajini

Primarna produkcija mokrišč je zelo variabilna. Z obsegom sprememb vodnega režima se veča tudi količina proizvedene biomase (Gaberščik in sod., 1998; Boulton in Brock, 1999). Primarna produkcija visokih barij, kjer so tla stalno nasičena z vodo, je majhna. Najbolj produktivna pa so mokrišča na prehodu voda/kopno. To so tako imenovana ekotonalna mokrišča (obrežna močvirja, slana močvirja v območju bibavice) (Leith in Whittaker, 1975; Gopal in sod., 1993). Tovrstni sistemi sodijo med najbolj produktivne sisteme na zemeljski obli. Larcher (1995) navaja, da je primarna produkcija v mokriščih od 1 do 6 kg m^{-2} $leto^{-1}$, medtem ko je v tropskem deževnem gozdu med 1 do 3,5 kg m^{-2} $leto^{-1}$.

S primarno produkcijo je povezan tudi potencial vezave ogljikovega dioksida in sproščanja kisika. Zaradi nasičenosti z vodo je razgradnja v nekaterih sistemih upočasnjena, zaradi česar se organske snovi kopičijo – mokrišča so zato ponor ogljikovega dioksida (Park, 2001).

Velika primarna produkcija je osnova kompleksnim prehranjevalnim spletom. Mokrišča so zato pomemben habitat številnih organizmov. So tudi otoki v pokrajini, kjer se živali, predvsem ptice, občasno zadržujejo in ustavljajo. V današnji razdrobljeni in spremenjeni

emphasises the importance of vegetation as the carrier of important processes that operate on wetlands. The variety of wetland forms is also captured in the variety of localised names such as wash, everglade, slough, swale, wallow, slob land, holm.

3. Role of wetlands in the landscape

The rate of primary production in a wetland is highly variable. As the water regime changes, so does the quantity of produced biomass (Gaberščik et al., 1988; Boulton and Brock, 1999). Primary production in raised bogs with permanently inundated soil is low. It is highest in wetlands that are situated on the transition between water and land. These are the so called ecotonal wetlands (coastal marshes, saline marshes in tidal areas) (Leith and Whitaker, 1975: Gopal et al., 1993) and range among the most productive systems in the world. Larcher (1995) states that primary production in wetlands varies from 1 to 6 kg m^{-2} $year^{-1}$, while in tropical forests it is between 1 and 3.5 kg m^{-2} $year^{-1}$.

Primary production also depends on the wetland's potential for carbon dioxide fixation and oxygen release. Owing to water saturation, decomposition in certain systems is slowed down and organic matter accumulates – wetlands are also known as sinks of carbon dioxide (Park, 2001).

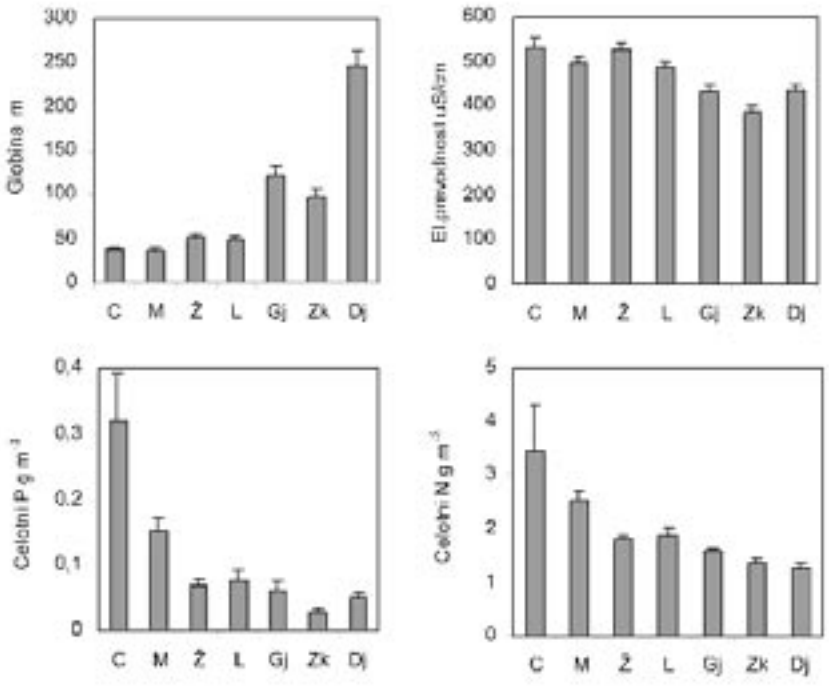
High primary production is the basis for complex food chains. Consequently, wetlands are an important habitat for many organisms. They are also islands in the landscape where animals, birds in particular, can occasionally rest and reside. In the present-day fragmented and modified landscape, coastal wetlands are of special importance as

pokrajini so posebno pomembna obrežna mokrišča, ki so povezava med ekosistemi in koridor za živalske vrste, ki se selijo (Owen in sod., 1998).

Mokrišča imajo tudi pomembno vlogo pri zaščiti vodnih teles pred onesnaženjem in vzdrževanju kakovosti vode. V mokriščih se količina vseh bremen (sedimentov, hranil in strupenih snovi) močno zmanjša, saj delujejo kot ponor in filter (Wetzel, 1990; Lakatos et. al. 1998). Pri tem so zelo učinkovita obrežna močvirja. Najbolj učinkoviti so sistemi, kjer se vodni režim neprestano spreminja (npr.: Cerkniško jezero) (Vaithiyannathan in Richardson, 1998; Gaberščik in Urbanc-Berčič, 2002a). Del leta so poplavljeni, občasno pa voda odteče in sistem se postopno izsuši. V poplavljenih tleh hitro zmanjka kisika (Wetzel, 1990; Brix, 1993). Pomanjkanje kisika bi lahko povzročilo motnje v kroženju snovi kar lahko vodi v kopičenje različnih strupenih snovi, ki negativno vplivajo na vitalnost rastlin (Boulton in Brock, 1999). Ker pa se sistem izsuši, se nakopičene strupene snovi ob prisotnosti kisika razgradijo. Hranila pa se vgradijo v biomaso primarnih producentov, kar se odraža v boljši kakovosti vode. Zmanjšanje obremenjenosti s hranili smo ugotovili tudi na Cerkniškem jezeru.

they form the link between ecosystems and corridors for migrating animal species (Owen et al., 1998).

Another important purpose of wetlands is their role in protecting water bodies from pollution and in maintaining water quality. The quantity of various loads (sediments, nutrients and toxic matter) is significantly lower in wetlands since they function as a sink and a filter (Wetzel, 1990; Lakatos et. al. 1998). Coastal wetlands are again very efficient in performing the task. Efficiency is highest in systems where the water regime is constantly changing (e.g. Lake Cerknica) (Vaithiyannathan and Richardson, 1998; Gaberščik and Urbanc-Berčič, 2002a). These systems are flooded for a part of the year but periodically the water drains away and the system gradually dries up. Inundated soil is quick to run out of oxygen (Wetzel, 1990; Brix, 1993). Shortage of oxygen, however, can cause disturbance in the circulation of material, which can lead to accumulation of various toxic substances that have a negative effect on plant vitality (Boulton and Brock, 1999). However, when the system dries out, the accumulated toxic substances decompose in the presence of oxygen. Nutrients are incorporated into the biomass of primary producers, which in turn contributes to higher water quality. A reduction in the nutrient load has also been noticed in Lake Cerknica. Although the water flowing into



Slika 3.1 / Picture 3.1: Skupne koncetracije soli (električna prevodnost) in koncentracije celotnega fosforja in dušika v pritokih Cerkniškega jezera (C – Cerkniščica, M – Martinščica, Ž – Žerovniščica in L – Lipsenjščica) ter v jezerski vodi, vzorčevani na lokacijah Gornje jezero (Gj), Zadnji Kraj (Zk) in Dolnje jezero (Dj). / Nutrient concentrations in the lake water.

Voda, ki priteka v jezero s pritoki, je obremenjena s hranili, v sami jezerski vodi pa smo določili precej nižje koncentracije hranil (Slika 3.1).

V takem presihajočem sistemu pa se zmanjša tudi obremenjenost vode z mikroorganizmi (skupnimi koliformnimi bakterijami in bakterijami fekalnega izvora) (Gaberščik in Urbanc-Berčič, 2002b). V času

the lake is nutrient-loaded, nutrient concentrations in the lake water were found to be much lower (picture 3.1).

Such an intermittent system also supports the load of microorganisms in the water (total microbial load of coliforms and bacteria of faecal origin) (Gaberščik and Urbanc-Berčič, 2002b). In the inundation period, wetland vegetation is an important factor in the matter cycle.

poplavljenja imajo posebno vlogo pri kroženju snovi močvirske rastline. Korenine, ki so zakoreninjene v poplavljenih tleh, se preko aerenhimov oskrbujejo s kisikom (Brix, 1993). Včasih pa je kisika celo toliko, da se sprošča v neposredno okolico korenin in pospešuje mineralizacijo. Človek je prepoznal prednosti nekaterih močvirskih rastlin, na primer navadnega trsta, zato ga je začel uporabljati tudi za čiščenje odpadnih voda (Gaberščik in Urbanc-Berčič, 2001).

Mokrišča so tudi zadrževalnik vode v pokrajini in tako vplivajo na količino talne vode, vodo v rekah in na lokalno klimo. Imajo tudi pomembno vlogo pri uravnavanju visokih voda. Kroženje vode vzdržuje energijsko ravnovesje na Zemlji in ustvarja klimo. Ko izsušujemo mokrišča, gradimo ceste, naselja, jezove in prekope, spreminjamo pokrajino. Spremembe vplivajo na lokalno kroženje vode in povzročajo spremembe v kakovosti našega okolja. Pomembno vlogo pri kroženju vode imajo rastline. Vsebujejo tudi do 90% vode. Vodo črpajo s koreninami in jo kontrolirano oddajajo skozi listne reže. Kadar je vode dovolj, so listne reže vseskozi odprte in oddajanje poteka po načelu difuzije (Larcher, 1995). Kadar pa nastopi suša, rastline z vodo aktivno gospodarijo. Oddajajo le toliko vode, da izgube ne ogrožajo njihovega osnovnega metabolizma. Zaradi zadrževalne vloge močvirskih rastlin se velik del vode vrača v ozračje na mestu, kjer je prišel na zemeljsko površino v obliki padavin. Raziskave so pokazale, da lahko obrečna mokrišča zadržijo v pokrajini celo več vode kot jo lokalno pade s padavinami (do 150 %), saj prestrežjo tudi del vode, ki jo reka zbere v zgornjem toku (Grin, 1972).

4. Ogroženost in varovanje

Spreminjanje mokriščnih habitatov poteka že več kot dve stoletji (Maitland in Morgan, 1997). V Sloveniji smo od 18. stoletja dalje izsušili kar 100.000 ha mokrišč (ARSO, 2001). Najbolj ogrožena so mokrišča v srednjem in spodnjem toku rek. Glavne grožnje mokriščem so spremembe vodnega režima, pridobivanje površin za kmetovenje, naselja in gradnjo infrastrukture (ceste), vdori tujerodnih rastlin, paša in teptanje ter globalne spremembe. Vplivi globalnih sprememb se odražajo predvsem v meteroloških ekstremih (temperaturah in razporeditvi padavin). Dolga obdobja brez padavin predstavljajo grožnjo predvsem visokim barjem. Pospešena razgradnja organskih snovi, zaradi spremembe vodnega režima, povzroči sproščanje hranil. To pa vpliva na tekmovalna razmerja rastlin na obrobju barij (Kutnar in sod., 2001). Obrobje barja se hitrejše zarašča, saj visokobarske rastline, predvsem šotni mahovi, počasi rastejo (Gaberščik in Martinčič, 1987).

Kljub pomembni vlogi mokrišč v pokrajini, pa raziskovalci že več kot dve desetletji opažajo tudi krčenje trstičnih mokrišč v Evropi. Ta pojav so poimenovali umiranje trstišč (“reed decline”). Rezultati

The roots growing from inundated soil are supplied with oxygen through aerenchyms (Brix, 1993). From time to time, the quantity of oxygen is sufficient to be released in the close vicinity of the roots and thus accelerate mineralisation. Man has come to realise the advantages of certain wetland plants, such as the common reed, and has started to use these for purifying of waste water (Gaberščik and Urbanc-Berčič, 2001).

Wetlands are also a water reservoir in the landscape and thus influence the quantity of ground water, river water and the local climate. They play an important role in regulating high water levels. Water cycle maintains the energy equilibrium on the Earth and creates the climate. As we drain our wetlands, construct roads, settlements, dams and canals, we change the landscape. These changes in turn affect the local water cycles and cause changes in the quality of our environment. Plants are an essential element in protecting the water cycle. They contain up to 90 % of water. They draw water with their roots and transmit it through stomata. When water is abundant, stomata are open and permit exchange of moisture by difusion (Larcher, 1995). In periods of drought, however, plants make economical use of water. They only exchange the quantity of water that does not endanger their own basic metabolism. Owing to their ability for water retention, wetland plants return a large amount of water back to the atmosphere at the same location where it fell on the Earth surface as precipitation. Research has shown that coastal wetlands can retain more water in the landscape than this landscape obtains through precipitation (up to 150 %) since they also intercept a part of the water the river gathers in its upper stream (Grin, 1972).

4. Endangerment and protection

Modification of wetland habitats has been underway for more than two centuries (Maitland and Morgan, 1997). In Slovenia, over 100,000 ha of wetland area have been drained since the 18th century (ARSO, 2001). The wetlands in the central and lower parts of river streams are the most endangered wetland type. The main threat to wetlands is posed by changes in the water regime, acquisition of new land for agriculture, settlements and construction of infrastructure (roads), intrusion of non-indigenous plants, grazing and stamping and global changes. The impact of global changes is clearly evident from meteorological extremes (temperatures and precipitation distribution). Long periods without rain are particularly damaging to raised bogs. Accelerated decomposition of organic matter, caused by changes in the water regime, leads to a release of nutrients. This in turn affects competitive relations between plants on the edges of bogs (Kutnar et al., 2001). Bog edges are overgrown at a faster rate since raised bog vegetation, peat mosses in particular, grow very slowly (Gaberščik and Martinčič, 1987).

Despite the important role of wetlands in the landscape, researchers have been reporting for over two decades that the reed wetlands in Europe are shrinking. The phenomenon was called »reed decline«. The results of an international project EUREED show that the main reason

mednarodnega projekta EUREED so pokazali, da je glavni vzrok evtrofizacija vodnih teles, zaradi česar pride do neravnovesja med metabolizmom ogljika in količino hranil (Gaberščik in Urbanc-Berčič, 1996; Čižkova in sod. 1996; Lakatos in sod. 1998; Gaberščik in sod. 1998). Organske snovi se v sistemih kopičijo. Zaradi pomanjkanja kisika se sproščajo organske kisline ter različne druge strupene snovi, ki imajo škodljive učinke na rastline. Do precejšnjega zmanjšanja površin trstišč je prišlo tudi na Blejskem jezeru, vendar so vzroki za to nejasni (Urbanc-Berčič in Gaberščik, 1995).

Zavedanje pomena mokrišč se povečuje že nekaj desetletij. Leta 1971 so se v Iranskem mestecu Ramsar srečali prestavniki 18 držav. Sestavili so listino, s katero se podpisniki obvezujejo, da bodo ohranjali mokrišča in s tem njihovo nepogrešljivo vlogo v pokrajini. Danes je pomembna vloga mokrišč izpostavljena tudi v okviru EU zakonodaje in različnih aktivnosti ob prepoznavanju območij posebnega pomena. Precej mokriščnih ekosistemov je zaobjetih na seznamu Mednarodno pomembna območja za ptice v Sloveniji (Polak, 2000). Dodatno pa lahko te dragocene naravne sisteme vključimo tudi na seznam Botanično pomembnih območij (Important plant areas - IPA), ki je v pripravi.

Večina groženj mokriščem je posledica človekovih dejavnosti v širšem povodju, zato je osnova za varovanje mokrišč celostno upravljanje v povodju. Priprava Planov upravljanja povodij v Sloveniji že poteka.

5. Vrednotenje mokrišč

Vrednotenje in pomen delov narave in procesov v njej je povezano z vlogo naravnih sistemov pri vzdrževanju kakovostnega okolja in je torej osnova za trajnostni razvoj. Naravoslovci so skupaj z ekonomisti ugotovili, da so glede na celovitost procesov, to najdragocenejši sistemi na zemeljski obli, če upoštevamo razmerje ponudba (razpoložljivost) in povpraševanje (pomen). Izračunali so, da je vloga mokrišča, kot sistema, ki je vključen v uravnavanje plinov v atmosferi, vredna 133 $/ha/leto, če pa so upoštevali vse obnovljive "usluge" mokrišča, pa to nanese kar 15.000 $/ha/leto (Constanza in sod., 1997). Ko se odločamo za posege v mokrišča, moramo upoštevati predvsem obseg posamezne "usluge" in strukturnih elementov. Dodatno vlaganje ne pomeni povečanja obsega posamezne "usluge". Navadno pa je naš vložek v naravne sisteme manjši od koristi, ki jih imamo, čeprav je dolgoročno nesporno, da je vlaganje v naravo edino, ki se dolgoročno izplača.

lies in the eutrophication of water bodies which destroys the balance between carbon metabolism and nutrient quantity (Gaberščik in Urbanc-Berčič, 1996; Čižkova et al. 1996; Lakatos et al. 1998; Gaberščik et al. 1998). Organic matter accumulates in these systems. Owing to the shortage of oxygen, organic acids are released, together with other toxic substances which have adverse effects on plants. A substantial reduction in reed area has also been observed in Lake Bled, but the reasons remain unclear (Urbanc-Berčič and Gaberščik, 1995).

The awareness of the importance of wetland areas has been on the rise for a number of decades. In 1971 representatives of 18 nations met in the Iranian city of Ramsar. They signed a document which binds all the contracting parties to conserve wetlands and their irreplaceable role in the landscape. Today, the important role of wetlands is also incorporated in the EU legislation and in various activities regarding the classification of special protection areas (SPAs). A number of wetland ecosystems have been included in the List of Internationally Important Bird Areas in Slovenia (Polak, 2000). Additionally, these areas can also be included in the list of Important Plant Areas (IPAs), which is currently in preparation.

The majority of threats to wetlands result from human action in drainage areas, and consequently integrated management of drainage areas remains the basis of wetland protection. Drainage Area Management Plans for Slovenia are already being prepared.

5. Wetland evaluation

Evaluation and the importance of parts of nature and natural processes are closely connected with the role natural systems play in the maintenance of quality environment and are as such the foundation of sustainable development. Nature scientists and economists have realised that in terms of integrity of processes, wetlands are the most valuable systems in the world regarding the relation between the supply (availability) and demand (importance). It has been calculated that the role of a wetland area as a system involved in the regulation of gases in the atmosphere is worth USD 133 /ha/year, and this sum amounts to USD 15,000 /ha/year if all the renewable services of a wetland area are considered (Constanza et al., 1997). In taking decisions on wetland interventions, we should closely consider the range of a service and structural elements. Additional investments do not necessarily mean increased range of a service. As a rule, our investment into natural systems is lower than the benefits we obtain from it, although investments in nature are indisputably the only profitable investment in the long run.

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Lado KUTNAR

EKOLOŠKO-VEGETACIJSKA RAZMERJA NA PREHODU MED BARJI IN GOZDOM NA POKLJUKI

Ecological-vegetation relationships on the transition between mires and forest on the Pokljuka plateau

V Julijskih Alpah, ki predstavljajo južni rob naravne razširjenosti sfagnumskih barij v Evropi, smo vzdolž prehoda med barji in njihovim obrobjem raziskovali ekološke odnose med vegetacijo in talnimi razmerami. Ugotavljali smo korelacije med rastlinskimi združbami in ekološkimi dejavniki, s posebnim poudarkom na talni vodi in kemijskih parametrih tal. Ordinacijska metoda je jasno razmejila med barji z visoko vsebnostjo kalcija, ki so poraščena z različnimi šašovji, in s kalcijem revnimi barji, poraščenimi z ruševji in s smrekovji. S to metodo so se pokazale tudi očitne razlike med barjansko vegetacijo in smrekovim gozdom na mineralnih tleh.

Glavna sklopa dejavnikov, ki najizraziteje vplivata na razlike med vegetacijskimi tipi, sta vlažnost (vsebnost vode v tleh) in pH/vsebnost kalcija v tleh. Dejavniki, ki pospešujejo vrstno pestrost barij in okoliškega gozda na Pokljuki, so visoki pH, visoka vsebnost kalcija in visoka stopnja nasičenosti z bazami. Pestrost pa pada z naraščanjem vsebnosti kislih kationov (Al, Fe, and H).

Kot rezultat ugodnih talnih in vlažnostnih razmer je rastlinska vrstna pestrost največja na nizkih (prehodnih) barjih in na prehodih proti smrekovemu gozdu na obrobju. Ta barja poraščajo različne združbe šašovij (Sphagno-Caricetum rostratae, Caricetum davallianae) in druge združbe, kot npr. Trichophoretum alpini. Za tla teh barij so značilni visoki povprečni pH, vsebnost kalcija in stopnja nasičenosti z bazami. Vrstna pestrost pa je razmeroma majhna v združbah barjanskega ruševja (Pino mugi-Sphagnetum s.lat.) in barjanskega smrekovja (Sphagno girgensohnii-Piceetum var.geogr. Carex brizoides), ki poraščajo šotna tla z nizkimi vrednostmi teh parametrov.

Ordinacija je nakazala tudi razlike med dvema tipoma smrekovega gozda na obrobju barij. Prvi tip smrekovega gozda (Rhytidiadelpho lorei-Piceetum cardaminetosum) je pod izrazitim vplivom podtalnice in sezonskih poplav. Drugi tip (Rhytidiadelpho lorei-Piceetum typicum/sphagnetosum) pa večinoma poraščа nekoliko dvignjena obrobja barij. Kot posledica relativno višjih vrednosti pH, vsebnosti kalcija, stopnje nasičenosti z bazami in nižjih vsebnosti aluminija je vrstna pestrost večja v prvem kot v drugem.

Vsebnost vode v tleh (momentalna vlažnost), vsebnost celotnega ogljika in razmerje C/N so med seboj v pozitivni korelaciji. Vrednosti teh parametrov so višja v šotnih tleh barij kot v mineralnih gozdnih tleh.

Šotna barja na Pokljuki imajo izreden pomen, saj ležijo na robu njihove naravne razširjenosti in so že zaradi tega močno ogrožena. Še posebej pa so ogrožena manjša barja, ki so zaradi skromnih dimenzij izraziteje podvržena različnim vplivom in spremembam.

In the eastern Julian Alps in Slovenia, at the southern border of the Sphagnum-mire area in Europe, the ecological relationships between vegetation and soil related variables along the mire margin - mire expanse gradient were investigated. The correlation between plant community and ecology, with particular reference to ground water and soil variables, was examined. Based on ordination, calcium-rich sedge fens were clearly distinguished from the calcium-poor dwarf-pine bogs and the spruce mires, as well as from the spruce forests on the mineral soils. The two most important primary environmental regimes were moisture (soil-water content) and pH-calcium base richness. The main factors that accelerate the plant diversity of the mires and of adjacent spruce forest on the Pokljuka plateau are high pH, high calcium content and high base saturation. The species richness increases with decreasing of acid cations (Al, Fe, and H).

As a result of favourable soil and water conditions, the plant species diversity was observed to be the highest in the area of sedge fens and their transition to spruce forests. The peat-soils of sedge fens overgrown by the Sphagno-Caricetum rostratae, Caricetum davallianae, and Trichophoretum alpini communities have high pH, the amount of calcium and the base saturation level. On the contrary, the diversity was low in the dwarf-pine bogs (Pino mugi-Sphagnetum s.lat.), and in the spruce mires (Sphagno girgensohnii-Piceetum var.geogr. Carex brizoides) where these parameters are low.

The ordination technique differentiated between the spruce forest under the influence of ground water or seasonal inundation (Rhytidiadelpho lorei-Piceetum cardaminetosum) and the upland spruce forest (Rhytidiadelpho lorei-Piceetum typicum/sphagnetosum). The first one (relatively high pH, high calcium content, high base saturation, and low aluminium content in soils), has significant richer species composition than the second one.

The soil-water content, total carbon content, C/N ratio, peat depth that are higher in the peat-soil of very different mires than in the forest mineral soils, they are in positive correlation with each other.

Because of location of the Pokljuka peat bogs at the edge of their natural range in Europe, they are especially endangered, which gives them added significance. As a result of modest size of research mires they are even more endangered than larger mires and particularly susceptible to changes.

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1 Uvod

Vegetacija in ekološki gradienti med različnimi tipi barij so pomembni kriteriji za njihovo klasifikacijo. Visoka in nizka barja običajno razmejujejo na osnovi kemizma talne vode in šote (Bridgham & Richardson 1993, Wheeler & Proctor 2000). Glavni ekološki gradienti, ki pojasnjujejo variabilnost med barji so: a) razlike v pH, distrične proti evtričnim razmeram; b) dostopnost glavnih hranil (N, P); c) nivo talne vode (Wheeler & Proctor 2000).

Na osnovi raziskav gradientov so na mnogih skandinavskih barjih (norveška, švedska in finska barja) ugotovili izrazito izmenjavo rastlinskih vrst z osrednjega dela barij (običajno brez večjih lesnatih rastlin) proti njihovemu obrobju (običajno porađčeno z drevjem). Izmenjava floristične sestave je rezultat specifičnih ekoloških razmer (¨kland et al. 2001).

Na barjih v severni Evropi so ugotovili tesno povezavo med rastlinsko združbo in ekološkimi gradienti, kot so npr. pH, alkalnost, vsebnost kationov (Wassen et al. 1989, Vitt & Chee 1990, Gorham & Janssens 1992). Pogosto so za razmejitev med različnimi tipi šotnih barij uporabili kriterija koncentracije Ca^{2+} ionov in pH talne vode (Malmer 1986). Vendar pa so tovrstne razmejitve med različnimi barji uporabne le na razmeroma omejenem območju njihovega nastanka (Braun-Blanquet 1964, Gore 1983).

Glede na povsem drugačne razmere na južni meji evropskega areala razširjenosti šotnih barij lahko predvidevamo, da so tu tudi povsem specifična razmerja med vegetacijo in ekološkimi razmerami. V severni Italiji, ki predstavlja obrobje areala šotnih barij, so opravili mnoge raziskave barjanske ekologije in vegetacije (Bragazza 1994, 1996, 1997, Gerdol 1995, Gerdol et al. 1994, Alber et al. 1996, Bragazza et al. 1998). Med razmeroma dobro ohranjena barja s tega obrobja sodijo tudi nekatera slovenska barja (Martinčič & Piskernik 1985).

Na Poklјuški planoti pa so poleg večjih in razmeroma dobro raziskanih barij (Martinčič & Piskernik 1985) tudi mnoge manjše barjanske površine. S proučevanji teh smo se intenzivneje začeli ukvarjati v zadnjem obdobju (Kutnar 2000a). Zanje je značilno, da so izrazito mozaično zgrajena, kar je posledica različnih lokalnih ekoloških vplivov in geografske lege na obrobju naravnega areala.

Barja, ki ležijo na meji med različnimi ekološkimi vplivi, so namreč še posebej zanimiva iz vidika biotske pestrosti (Korpela & Reinikainen 1996a, 1996b). Zato smo se v raziskavi osredotočili na glavne dejavnike, ki pospešujejo vrstno pestrost in pojavljanje vrst vzdolž gradienta barje-gozd. Poleg vidika pestrosti daje obravnavanim šotnim barjem poseben pomen tudi vidik ogroženosti kot posledica njihove majhnosti in lege na robu njihove naravne razširjenosti.

1 Introduction

Vegetation and ecological gradients in various mire types are important criteria for mire classification. Raised bogs and fens are usually separated on the basis of the chemism of ground water and peat (Bridgham & Richardson 1993, Wheeler and Proctor 2000). The main ecological gradients explaining mire variability are: a) variations in pH value, dystric versus eutric; b) accessibility of main nutrients (N, P); c) ground water level (Wheeler and Proctor 2000).

Gradient analyses have shown that in many Scandinavian mires (Norwegian, Swedish and Finnish mires) there is an explicit exchange of plant species from the centre of the mire (usually without large bushes and trees) towards the edge of the mire (usually overgrown with trees). The exchanges within the floristic composition are a result of specific ecological circumstances (Økland et al. 2001).

In North-European mires a close connection has been determined between plant communities and ecological gradients such as pH, alkalinity and cation content (Wassen et al. 1989, Vitt & Chee 1990, Gorham & Janssens 1992). Various types of peatland are commonly distinguished on the basis of the concentration of Ca^{2+} ions and the pH value of groundwater (Malmer 1986). Nevertheless, such differentiation can only be applied to a relatively limited area where a mire has formed (Braun-Blanquet 1964, Gore 1983).

Judging from the fact that the conditions at the southern border of European peat bog distribution area are completely different, we can assume that the relations between vegetation and ecological gradients are very specific. In Northern Italy, the border zone of the peat bog distribution area, research was carried out into mire ecology and vegetation (Bragazza 1994, 1996, 1997, Gerdol 1995, Gerdol et al. 1994, Alber et al. 1996, Bragazza et al. 1998). Some Slovene mires can be classified among the well-preserved mires of that border zone (Martinčič & Piskernik 1985).

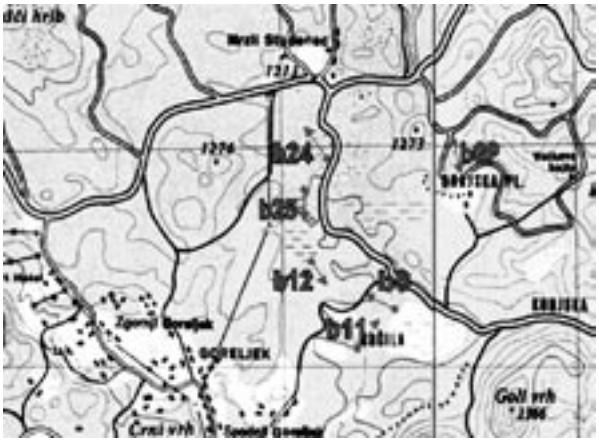
Besides large and relatively well-researched bogs, the Pokljuka plateau is home to many small mires. Recently, we have become actively involved in the studies of these areas (Kutnar 2000a). The mires have a characteristic mosaic structure, resulting from various local ecological influences and the geographic position in the border zone of the mire distribution range.

The mires located along the borders between various ecological impacts are particularly interesting in terms of biodiversity (Korpela & Reinikainen 1996a, 1996b). Consequently, this research focuses on the main factors which promote species diversity and on the occurrence of species along the transition between mires and forest. In addition to biodiversity value, peat bogs are important because of the endangered status they enjoy on account of their small size and location on the edge of the distribution range.

2 Raziskovalno območje in metode

2. 1 Terensko vzorčenje

Raziskava je potekala na barjih na Pokljuški planoti, ki leži v Julijskih Alpah (46°20' N, 13°59' E). Izbrali smo 6 manjših barij (površina manjša od 5 ha), ki ležijo v bližini barja Šijec in Velikega Blejskega barja (slika 1). Vzdolž gradientov barje-gozd smo sistematično razvrstili 6 nizov (transektov) po 7 ploskev (slika 2). Velikost ploskev je bila 2 metra × 4 metre.



Slika 1: Položaj raziskovalnih objektov na Pokljuški planoti (smer puščice prikazuje razporeditev raziskovalnih ploskev od št. 1 do št. 7 v posameznem nizu)

Figure 1: Position of research objects on the Pokljuka plateau (direction of arrows show sequence of the plots from number 1 to 7)

Vegetacijo smo popisali po standardni srednjeevropski metodi (Braun-Blanquet 1964). Ocenili smo stopnjo zastiranja posebej za drevesno, grmovno, zeliščno in mahovno plast.

Kot nomenklaturne vire smo uporabili naslednje: Martinčič et al. (1999) za praprotnice in semenke; Corley et al. (1981), Corley & Crundwell (1991), Grolle & Long (2000) za mahove. Fitocenološko opredelitev vrst smo upoštevali po Oberdorferju (1983, 1992).

Na 168 ogliščih vseh raziskovalnih ploskev smo iz globine 0-10 cm vzeli vzorce tal. Pri tem nismo zajeli plasti živih mahov in opada. Za vseh 42 ploskev smo pripravili združen vzorec iz 4 ogliščnih vzorcev.

2.2 Analiza talnih vzorcev

Talni vzorci so bili analizirani v Laboratoriju za gozdno ekologijo Gozdarskega inštituta Slovenije. Vzorcem smo določili naslednje lastnosti:

- vrednosti pH v deionizirani vodi (H_2O) elektrometrično, s stekleno elektrodo (ISO/DIS 10390);
- vsebnosti celotnega dušika (N_{tot}) po modificirani Kjeldahlovi metodi po standardu ISO/DIS 11261;
- vsebnosti celotnega ogljika (C_{tot}) s suhim sežigom po

2 Research area and methods

2. 1 Field sampling

The research was carried out in mires on the Pokljuka plateau in the Julian Alps (46°20' N, 13°59' E). The research included 6 small mires (surface area less than 5 ha), located in the vicinity of the Šijec bog and the bog Veliko Blejsko barje (fig. 1). Along the mire-forest gradients, 6 transects of 7 plots (fig.2) were systematically placed. The size of a plot was 2 m x 4 m.

Slika 2: Niz raziskovalnih ploskev na prehodu med barjem in obrobnim gozdom. Vsak niz vsebuje del ploskev, ki ležijo na šotnih, barjanskih (hidromorfnih) tleh, in vsaj eno (ali več) ploskev, ki leži na mineralnih (avtomorfnih) tleh v gozdu. Razdalja med ploskvami v posameznem nizu je konstantna. Razdalje med ploskvami posameznega niza so različne glede na dimenzije barja in so v razponu od 19 do 31 metrov.

Figure 2: Set of research plots at the mire-forest transition zone. Each set includes plots on the peat-soils, and at least one plot (or more) on forest mineral-soils. The distance between plots in each set (mire) is constant, but according to dimension of mire, it varies from set to set. The plot-distance in sets (mires) ranges between 19 and 31 metres.

The standard Central European method (Braun-Blanquet 1964) was used for the classification of vegetation. The coverage rate was assessed for canopy, bush, herbal and moss layers separately.

The following nomenclature sources were used: Martinčič et al. (1999) for ferns (Pteridophyta) and seed plants (Spermatophyta); Corley et al. (1981), Corley & Crundwell (1991), Grolle & Long (2000) for moss species (Bryophyta). Phytocenological classificiation of species was adapted from Oberndorfer (1983, 1992).

At 168 nodes of research plots soil samples were taken at the depth of 0-10 cm. The layer of living mosses and defoliage was not included in sample-taking. For all 42 plots, a consolidated sample was prepared from 4 node samples.

2.2 Analysis of soil samples

Soil samples were analysed at the Laboratory for Forest Ecology at the Slovenian Forestry Institute. The following parameters of the samples were determined:

standardu ISO/DIS 10694;
- vsebnosti izmenljivih kationov (Ca, Mg, K, Al, Fe, Mn) z atomsko absorbcijsko spektroskopijo po ekstrakciji talnih vzorcev z 0,1 M $BaCl_2$ (ISO/DIS 11260). Koncentracijo izmenljivega H smo določili iz pH vrednosti ekstrakta vzorca z 0,1 M $BaCl_2$.

Računsko smo določili še:
- vsebnosti organskega ogljika ($C_{org} = C_{tot} - C_{min} = C_{tot} - (CaCO_3 * 0.12)$);
- razmerja med organskim ogljikom in celotnim dušikom (C/N);
- stopnjo nasičenosti z bazami BS = (Ca + Mg + K) / (SUM vseh izmenljivih kationov)*100) [%].

Vzorce za trenutno ali momentalno vlažnost tal (MV), ki predstavlja delež vode v vzorcu tal (ISO/DIS 11461), smo odvzeli iz globine 5 centimetrov. Vzeli smo jih pozno pomladi (20. maj – MV-m) in sredi poletja (11. avgust – MV-a).

Izračun trenutne vlažnosti poteka po naslednji formuli: $MV = (m_V - m_{105})/ m_{105} * 100$ [%].

Pri tem je:

MV	trenutna vlažnost vzorca;
m_V	masa odvzetega vzorca tal;
m_{105}	masa vzorca, posušenega pri 105ºC.

2.3 Analiza podatkov

Na osnovi fitocenoloških popisov smo analizirali število (bogastvo) vrst in izračunali Shannonov indeks pestrosti (Shannon & Weaver 1949).

S klastrsko analizo (razvrščanje v skupine) smo oblikovali skupine podobnih ploskev. Osnova za oblikovanje skupin je bila floristična sestava, stopnja zastiranja posameznih vrst in vertikalna členitev.

Glavne strukturne in ekološke gradiente smo prikazali z DCA (Detrended Correspondence Analysis) ordinacijo (Hill & Gauch 1980). Za klastrsko analizo in DCA ordinacijo smo uporabili računalniški paket PC-ORD (McCune & Mefford 1999). Za analize smo stopnjo zastiranja vrst prilagodili v skladu z van der Maarelovo modifikacijo (1979).

Izračunali smo tudi neparametrični Spearmanov korelacijski koeficient med DCA koordinatami (score) in: a) stopnjo zastiranja vertikalnih plasti (drevesna, grmovna, zeliščna, mahovna plast); b) vrstno pestrostjo (Shannonov indeks, število vrst); c) talnimi dejavniki.

Za test razlik med vegetacijskimi tipi (skupinami podobnih ploskev) smo uporabili analizo variance (ANOVA).

- pH value in deionised water (H_2O), tested electrometrically, with a glass electrode (ISO/DIS 10390);
- total nitrogen content (N_{tot}), a modified Kjeldahl method (ISO/DIS 11261) was used;
- total carbon content (C_{tot}), dry combustion method (ISO/DIS 10694) was used;
- exchangeable cation content (Ca, Mg, K, Al, Fe, Mn), atomic absorption spectroscopy following 0.1M $BaCl_2$ extraction (ISO/DIS 11260) was used. The concentration of exchangeable H was derived from the pH value of the 0.1M $BaCl_2$ sample.

Additionally, these parameters were computed:
- organic carbon content ($C_{org} = C_{tot} - C_{min} = C_{tot} - (CaCO_3 * 0.12)$);
- relation between organic carbon and total nytrogen (C/N);
- base saturation rate BS = (Ca + Mg + K) / (SUM of all exchangeable cations)*100) [%].

The samples to measure current humidity of the soil (CH), that is the share of water in the soil sample (ISO/ DIS 11461), were taken from the depth of 5 cm. The samples were taken in late spring (20 May – CH-m) and in mid-summer (11 August – CH-a).

The following formula is used in the calculation of current humidity: $CH = (m_V - m_{105})/ m_{105} * 100$ [%].

where

CH	current sample humidity;
m_V	weight of soil sample;
m_{105}	weight of sample dried at 105 ºC.

2.3 Data analysis

The number (richness) of species was analysed on the basis of phytocenological inventories, using the Shannon-Weaver diversity index (Shannon & Weaver 1949).

Cluster analysis was applied to form groups of similar plots. The plants were classiffied into groups on the basis of floristic structure, coverage rate of individual species and vertical distribution.

The main structural and ecological gradients were presented in a Detrended Correspondence Analysis (DCA) ordination (Hill & Gauch 1980). PC-ORD software (McDune & Mefford 1999) was used to perform cluster analyses and DCA ordination. For the purpose of the analyses, coverage rates were adjusted using a modification method introduced by van der Maarel (1979).

The non-parametric Spearman Correlation Coefficient of DCA coordinates (score) was computed for: a) coverage rate of vertical forest layers (canopy (overstory), bushes (understory), herbs and mosses (forest floor)); b) species diversity (Shannon index, number of species); c) soil factors.

The differences between various vegetation types (groups of similar plots) were analysed using the analysis of variance (ANOVA).

3 Rezultati

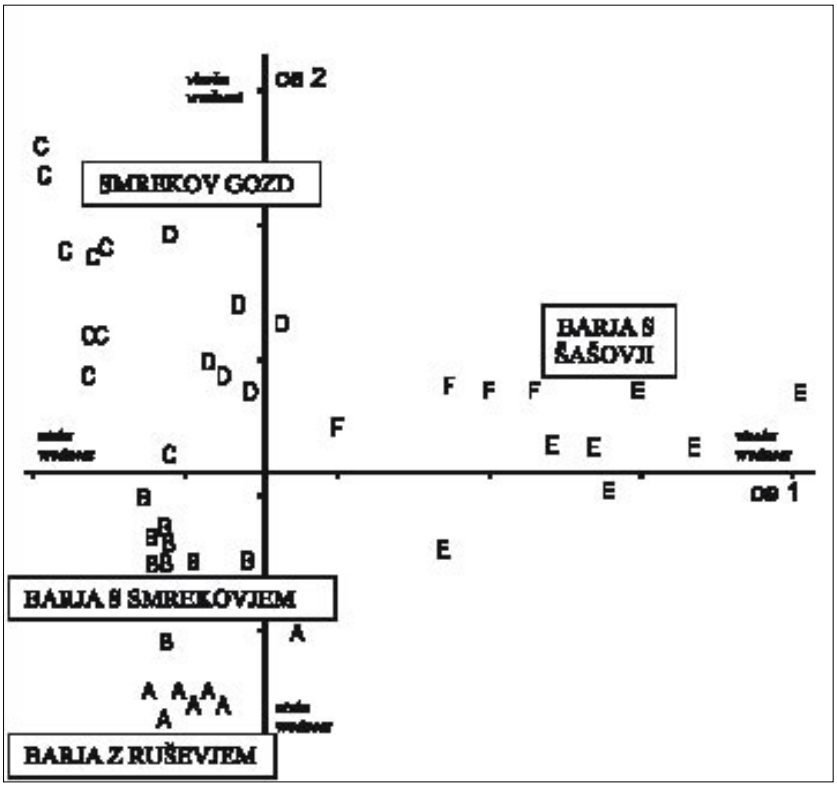
3.1 Vegetacija

Osnovo za opredelitev fitocenoloških enot so predstavljale predhodne raziskave, ki obravnavajo podobne vegetacijske tipe. Barjanska smrekovja je proučeval Zupančič (1982), barjanska ruševja pa Martinčič in Piskernik (1978, 1985). Združbe nizkih barij je raziskoval Martinčič (1995). Smrekove gozdove je kompleksno raziskoval Zupančič (1999).

3 Results

3.1 Vegetation

Phytocenological units were classified on the basis of previously conducted research on similar vegetation types. Spruce (Picea) mires were studied by Zupančič (1982), and Pinus mugo mire woods were researched by Martinčič and Piskernik (1978, 1985). Fen plant communities were researched by Martinčič (1995). A detailed survey of spruce forests was carried out by Zupančič (1999).



Grafikon 1: DCA ordinacija 42 raziskovalnih ploskev med osema 1 in 2. Oznake A do F se nanašajo na oznako vegetacijskih skupin.

Graph 1: DCA ordination of the 42 sample plots for axes 1 and 2. The letters A to F refer to six main vegetation types

S klastrsko analizo smo oblikovali skupine podobnih ploskev, ki smo jih na osnovi predhodnih raziskav vegetacije uvrstili v sledeče sintaksone:

A) barjansko ruševje (Pino mugi-Sphagnetum);
B) barjansko smrekovje (Sphagno girgensohnii-Piceetum var. geogr. Carex brizoides);
C) smrekov gozd na revnejših mineralnih tleh (Rhytidiadelpho lorei-Piceetum typicum in sphagnetosum girgensohnii);
D) smrekov gozd na bogatejših mineralnih tleh (Rhytidiadelpho lorei-Piceetum cardaminetosum);
E) barjanska šašovja in druge združbe nizkih (prehodnih) barij (npr. Sphagno-Caricetum rostratae, Caricetum davallianae, Trichophoretum alpini);
F) prehod med združbami nizkih barij (E) in smrekovim gozdom (D).

Through cluster analysis, groups of similar plots were identified and classified into the following syntaxons on the basis of previous research results:

A) dwarf pine mire woods (Pino mugi-Sphagnetum);
B) spruce mire (Sphagno girgensohnii-Piceetum var. geogr. Carex brizoides);
C) spruce forests on nutrient-poor mineral soil (Rhytidiadelpho lorei-Piceetum typicum and sphagnetosum girgensohnii);
D) spruce forests on nutrient-rich mineral soil (Rhytidiadelpho lorei-Piceetum cardaminetosum);
E) sedge mire and other plant communities of fen (transitional) mires (e.g. Sphagno-Caricetum rostratae, Caricetum davallianae, Trichophoretum alpini);
F) transition between fen plant communities (E) and spruce forests (D).

Ordinacija je izdvojila skupine ploskev, ki jih poraščajo barjanska smrekovja, barjanska ruševja, barjanska šašovja in različni smrekovimi gozdovi na mineralnih tleh (grafikon 1). Združbe nizkih (prehodnih) barij ter njihovih prehodov proti smrekovemu gozdu se pojavljajo pri relativno višjih vrednostih DCA1 osi (desna stran grafikona). Ploskve poraščene z drugimi tipi vegetacije so pri nižjih vrednostih DCA1 osi in se jasno razlikujejo vzdolž DCA2 osi. Tako so smrekovja na mineralnih tleh pri razmeroma visokih vrednostih DCA2 osi, barjanska ruševja pa pri nizkih vrednostih te osi. Ploskve, ki so poraščene z barjanskim smrekovjem, so blizu izhodišča (srednje vrednosti DCA2).

Na 42 raziskovalnih ploskvah smo našli skupaj 170 vrst. V DCA ordinaciji vrst (grafikon 2) je prikazano le 97 rastlinskih vrst, ki se pojavljajo vsaj na 3 ploskvah (glej prilogo 1).

V ordinaciji rastlin se pri visokih vrednostih DCA1 osi pojavljajo značilne vrste za nizka barja (npr. Carex rostrata, Carex davalliana, Trichophorum alpinum, Carex flava agg., Pinguicula vulgaris, Eriophorum latifolium, Menyanthes trifoliata, Cardamine pratensis, Euphrasia rostkoviana, Cardamine pratensis).

To so predvsem vrste iz razredov Scheuchzerio-Caricetea fuscae in Molinio-Arrenatheretea (Oberdorfer 1983, 1992). Poleg teh pa so na desni strani grafikona 2 tudi nekateri mahovi značilni za nizka barja oz. prehode (npr. Drepanocladus cossonii, Campylium stellatum, Bryum pseudotriquetrum, Aulacomnium palustre, Homalothecium nitens). Pri visokih vrednostih DCA1 osi je koncentracija rastlinskih vrst največja, kar nakazuje na največjo vrstno pestrost združb nizkih barij in njihovih prehodov v obrobne smrekove gozdove (glej tudi prilogo 1).

Vrste barjanskih ruševij, barjanskih smrekovij in smrekovih gozdov na mineralnih tleh najdemo pri nižjih vrednostih DCA1 osi.

Značilne vrste ombro-oligotrofnih barij z ruševjem (npr. Pinus mugo, Eriophorum vaginatum, Oxycoccus palustris, Carex pauciflora, Polytrichum strictum) so pri nizkih vrednostih DCA2 osi. Poleg teh značilnih vrst iz razreda Oxycocco-Sphagnetea se z njimi pojavljajo tudi mnoge vrste rodu Sphagnum (npr. Sphagnum magellanicum, Sphagnum russowii, Sphagnum flexuosum, Sphagnum capillifolium, Sphagnum fallax). Te vrste pa niso vezane samo na barjansko ruševje, saj jih pogosto najdemo tudi v barjanskem smrekovju (priloga 1). Značilne vrste za ombro-oligotrofna barja s prevladujočo smreko (npr. Carex brizoides, Sphagnum girgensohnii, Polytrichum commune) so blizu ordinatnemu izhodišču. Blizu izhodišča so tudi vrste, ki se pojavljajo v zelo različnih tipih vegetacije (npr. Picea abies, Vaccinium myrtillus, Vaccinium vitis-idaea, Maianthemum bifolium, Pleurozium schreberi, Hylocomium splendens).

The ordination releaved groups of plots which are overgrown with spruce mire, dwarf pine mire woods, sedge mires and diverse spruce forests on mineral soil (graph 1). Plant communities of fen (transitional) mires and their transitions to spruce forests have relatively higher scores on the DCA1 axis (right side of the graph). The plots overgrown with other vegetation types have lower scores on the DCA1 axis and indicate clear differences along the DCA2 axis. Spruce forests on mineral soils have relatively high scores on the DCA2 axis, whereas dwarf pine mire woods are relatively low on the axis. The plots covered with spruce mire are close to the origin of the system (medium scores on DCA2).

On a total of 42 research plots 170 plant species were recorded. The DCA ordination of species (graph 2) presents only 97 plant species which occur in minimum 3 plots (see Annex 1).

As regards plant species ordination, the scores high on the DCA1 axis represent characteristic fen species (e.g. Carex rostrata, Carex davalliana, Trichophorum alpinum, Carex flava agg., Pinguicula vulgaris, Eriophorum latifolium, Menyanthes trifoliata, Cardamine pratensis, Euphrasia rostkoviana, Cardamine pratensis).

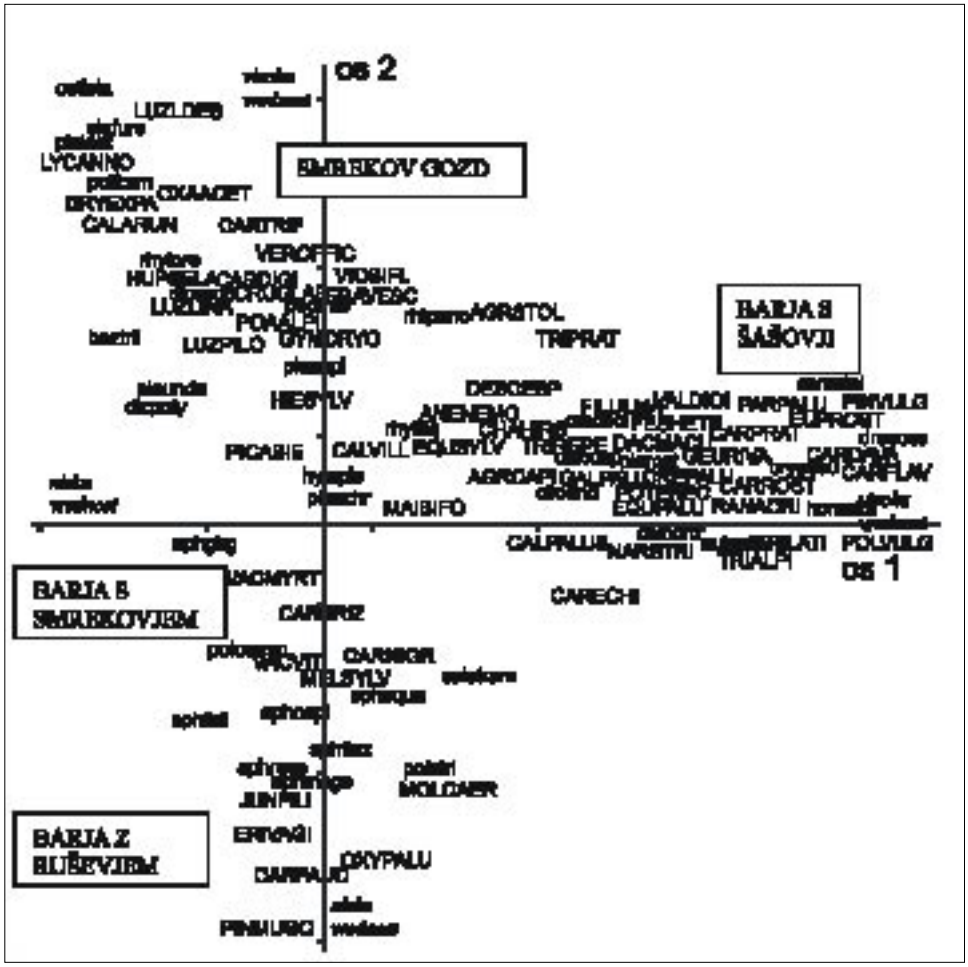
Most of these species belong to the classes of Scheuchzerio-Caricetea fuscae and Molinio-Arrenatheretea (Oberdorfer 1983, 1992). Besides these species, the right side of graph 2 also presents some mosses, typical of fens or transitional mires (e.g. Drepanocladus cossonii, Campylium stellatum, Bryum pseudotriquetrum, Aulacomnium palustre, Homalothecium nitens). High scores on the DCVA1 axis indicate highest concentration of plant species, which in turn shows that species diversity is highest in fen associations and in the transition areas between fens and spruce forests growing on their edges (see also Annex 1).

Dwarf pine mire woods, spruce mire and spruce forests on mineral soil can be found at lower scores on the DCA1 axis.

The typical species of ombro-oligotrophic dwarf pine mire woods (e.g. Pinus mugo, Eriophorum vaginatum, Oxycoccus palustris, Carex pauciflora, Polytrichum strictum) are located at low scores along the DCA2 axis. In addition to the characteristic members of the class Oxycocco Sphagnetea, many species of the order Sphagnum (e.g. Sphagnum magellanicum, Sphagnum russowii, Sphagnum flexuosum, Sphagnum capillifolium, Sphagnum fallax) can also be found there. These species, however, are not only linked to dwarf pine mire woods but can also be found in spruce mires (Annex 1). The species, typical of ombro-oligotrophic mires with spruce as the dominant species (e.g. Carex brizoides, Sphagnum girgensohnii, Polytrichum commune) are located close to the origin of the ordination system. The same location within the ordination system is occupied by the species which occur in highly diverse vegetation types (e.g. Picea abies, Vaccinium myrtillus, Vaccinium vitis-idaea, Maianthemum bifolium, Pleurozium schreberi, Hylocomium splendens).

Pri višjih vrednostih DCA2 osi so vrste, značilne za smrekov gozd, kot npr. Lycopodium annotinum, Luzula luzuloides, Oxalis acetosella, Polytrichum formosum, Rhytidiadelphus loreus in mnoge druge iz razreda Vaccinio-Piceetea.

Higher scores along the DCA2 axis are typical of spruce forest species such as Lycopodium annotinum, Luzula luzuloides, Oxalis acetosella, Polytrichum formosum, Rhytidiadelphus loreus and many other species of the class Vaccinio-Piceetea.



Grafikon 2. DCA ordinacija 97 rastlinskih vrst med osema 1 in 2.

Graph 2. DCA ordination of the 97 plant species for axes 1 and 2.

Rastlinske vrste (praprotnice in semenke so napisane z velikimi tiskanimi črkami) / Plant species (vascular plants are in capital letters):

Agrostis capillaris - AGRCAPI; Agrostis stolonifera - AGRSTOL; Anemone nemorosa - ANENEMO; Aulacomnium palustre - aulpalu; Bazzania trilobata - baztril; Bryum pseudotriquetrum - brypseu; Calamagrostis arundinacea - CALARUN; Calamagrostis villosa - CALVILL; Calliergon cordifolium - calcord; Calliergon stramineum - calstram; Calliergonella cuspidata - calcusp; Caltha palustris - CALPALUST; Campylium stellatum - camstel; Cardamine pratensis agg. - CARPRAT; Cardamine trifolia - CARTRIF; Carex brizoides - CARBRIZ; Carex davalliana - CARDAVA; Carex digitata - CARDIGI; Carex echinata - CARECHI; Carex flava agg. - CARFLAV; Carex nigra - CARNIGR; Carex pauciflora - CARPAUC; Carex rostrata - CARROST; Cetraria islandica - cetisla; Chaerophyllum hirsutum - CHAHIRS; Cladonia furcata - clafurc; Climacium dendroides - clidend; Cratoneuron decipiens - cradeci; Crepis paludosa - CREPALU; Cruciata glabra - CRUGLAB; Dactylorhyza maculata - DACMACU; Deschampsia cespitosa - DESCESP; Dicranum polysetum - dicpoly; Dicranum scoparium - dicscop; Drepanocladus cossonii - drecoss; Dryopteris expansa - DRYEXPA; Equisetum palustre - EQUPALU; Equisetum sylvaticum - EQUSYLV; Eriophorum latifolium - ERILATI; Eriophorum vaginatum - ERIVAGI; Euphrasia rostkoviana - EUPROST; Festuca heterophylla - FESHETE; Filipendula ulmaria - FILULMA; Fragaria vesca - FRAVESC; Galium palustre - GALPALU; Geum rivale - GEURIVA; Gymnocarpium dryopteris - GYMDRYO; Hieracium sylvaticum - HIESYLV; Homalothecium nitens - homnite; Huperzia selago - HUPSELA; Hylocomium splendens - hylsple; Juncus filiformis - JUNFILI; Luzula luzulina - LUZLINA; Luzula luzuloides - LUZLDES; Luzula pilosa - LUZPILO; Lycopodium annotinum - LYCANNO; Maianthemum bifolium - MAIBIFO; Melampyrum sylvaticum - MELSYLV; Molinia caerulea - MOLCAER; Nardus stricta - NARSTRI; Oxalis acetosella - OXAACET; Oxycoccus palustris - OXYPALU; Parnassia palustris - PARPALU; Pedinophyllum interruptum - pedinte; Picea abies - PICABIE; Pinguicula vulgaris - PINVULG; Pinus mugo - PINMUGO; Plagiochila asplenioides - plaaspl; Plagiomnium rostratum - plarost; Plagiothecium laetum - plalaet; Plagiothecium undulatum - plaundu; Pleurozium schreberi - pleschr; Poa alpina f. vivipara - POAALPI; Polygala vulgaris - POLVULG; Polytrichum commune - polcomm; Polytrichum formosum - polform; Polytrichum strictum - polstri; Potentilla erecta - POTEREC; Ranunculus acris - RANACRI; Rhizomnium punctatum - rhipunc; Rhytidiadelphus loreus - rhylore; Rhytidiadelphus triquetrus - rhytriq; Sphagnum capillifolium - sphcapi; Sphagnum girgensohnii - sphgirg; Sphagnum magellanicum - sphmage; Sphagnum flexuosum - sphflex; Sphagnum fallax - sphfall; Sphagnum russowii - sphruss; Sphagnum squarrosum - sphsqua; Trichophorum alpinum - TRIALPI; Trifolium pratense - TRIPRAT; Trifolium repens - TRIREPE; Vaccinium myrtillus - VACMYRT; Vaccinium vitis-idaea - VACVITI; Valeriana dioica - VALDIOI; Veronica officinalis - VEROFFIC; Viola biflora - VIOBIFL.

DCA1 os je v tesni korelaciji s stopnjo zastiranja zeliščne plasti (preglednica 1), medtem ko je DCA2 os v korelaciji z zastiranjem drevesne plasti. Negativna korelacija med DCA2 osjo in stopnjo zastiranje mahovne plasti kaže na večjo prisotnost mahov na ploskvah, ki so poraščene z barjanskim ruševjem.

Število vrst in indeks pestrosti naraščata proti ploskvam, ki so poraščene z različnimi združbami nizkih barij (skupini E in F), kar je razvidno iz pozitivne korelacije med tema parametroma in DCA1 osjo (preglednica 1). Največje število rastlinskih vrst (34,0 vrst na ploskev) smo v povprečju našli na ploskvah, ki ležijo na prehodu med nizkimi barji in smrekovim gozdom (skupina F). Pestro rastlinsko sestavo smo našli tudi na ploskvah, ki ležijo na nizkih (mezo-evtrofnih) barjih iz skupine E (povprečno 33,4 vrst na ploskev). Za te ploskve pa smo ugotovili največje vrednosti Shannonovega indeksa pestrosti (H' = 2,42).

The DCA1 axis is in close correlation with the herbal layer coverage rate (table 1), while the DCA2 axis is in correlation with the canopy coverage rate. A negative correlation between the DCA2 axis and the coverage rate of mosses indicates a higher presence of mosses on plots overgrown with dwarf pine mire woods.

The number of species and diversity index both increase towards the plots which are overgrown with various fen communities (Groups E and F), as evident from the positive correlation between these two parameters and the DCA1 axis (table 1). On average, the number of species was highest (34.0 species per plot) in the plots located in the transition area between fens and spruce forests (Group F). A diverse vegetation structure was also recorded in plots lying on lowland (meso-eutrophic) mires of Group E (average of 33.4 species per plot). These plots recorded the highest values of the Shannon diversity index (H' = 2.42).

Preglednica 1. Spearmanova korelacija rangov med DCA osem in 1) zastiranjem vertikalnih plasti; 2) vrstno pestrostjo; 3) parametri tal. Parametri tal: MV-m – trenutna vlažnost v maju, MV-a – trenutna vlažnost v avgustu, pH – reakcija tal, Ctot – celoten ogljik, Ntot – celoten dušik, C/N – razmerje med organskim ogljikom in celotnim dušikom, Ca – izmenljivi kalcij, K - izmenljivi kalij, Mg - izmenljivi magnezij, Al - izmenljivi aluminij, Fe – izmenljivo železo, Mn - izmenljivi mangan, H - izmenljivi vodik, BS – nasičenost z bazami

Table 1: Spearman rank correlations between DCA scores and 1) cover of vertical layers, 2) plant species diversity, 3) soil variables. Soil variables: MV-m - soil-water content in May, MV-a - soil-water content in August, pH - soil reaction, Ctot - total carbon, Ntot - total nitrogen, C/N - carbon/nitrogen ratio, Ca - exchangeable calcium, K - exchangeable potassium, Mg - exchangeable magnesium, Al - exchangeable aluminium, Fe - exchangeable iron, Mn - exchangeable manganese, H - exchangeable hydrogen, BS - base saturation, peat depth - depth of peat soil

**** = p≤0.001, ** = 0.001<p≤0.010, * = 0.010<p≤0.050.*

DCA os / axis	1	2	3
1)			
drevesna plast / tree layer cover	-0.319*	0.562***	-0.138
grmovna plast / shrub layer cover	-0.078	-0.472**	-0.049
zeliščna plast / herb layer cover	0.684***	-0.281	0.166
mahovna plast / moss layer cover	0.124	-0.735***	0.262
2)			
Shannon H'	0.779***	-0.247	0.299
število vrst / species richness	0.785***	0.124	0.102
3)			
MV-m	0.163	-0.923***	0.307*
MV-a	0.169	-0.834***	0.324*
pH	0.757***	0.333*	0.173
Ctot	0.122	-0.901***	0.163
Ntot	0.587***	-0.511***	0.231
C/N	-0.343*	-0.676***	-0.001
Ca	0.836***	-0.267	0.190
Mg	0.369*	-0.627***	0.212
K	0.182	-0.668***	0.177
Al	-0.837***	0.244	-0.204
Fe	-0.674***	-0.207	-0.021
Mn	0.713***	-0.095	0.137
H	-0.704***	-0.416**	-0.100
BS	0.825***	-0.129	0.226
globina šote /peat depth	0.212	-0.851***	0.138

Preglednica 2. Srednje vrednosti talnih parametrov po vegetacijskih tipih (skupinah). N = število raziskovalnih ploskev, ki spadajo v posamezen vegetacijski tip. † Razlike med tipi (skupinami) smo testirali z analizo variance (one-way ANOVA).

Table 2. Mean values of soil variables in the vegetation types. N = number of sample plots of each vegetation type. † Differences between vegetation types were tested with one-way ANOVAs.

*** = p≤0.001, ** = 0.001<p≤0.010, * = 0.010<p≤0.050.

OZNAKA SKUPINE	BARJA Z RUŠEVJEM dwarf-pine mires	BARJA S SMREKOVJEM spruce mires	SMREKOV GOZD spruce forest	SMREKOVGOZD spruce forest	NIZKA (PREHODNA) BARJA S ŠAŠOVJI sedge fens	
SINTAKSONOMSKA OZNAKA	Pino mugi-Sphagnetum	Sphagno girgensohnii-Piceetum var. geogr. Carex brizoides	Rhytidiadelpho lorei-Piceetum typicum / sphagnetosum	Rhytidiadelpho lorei-Piceetum cardaminetosum	Sphagno-Caricetum rostratae Caricetum davallianae Trichophoretum alpini	
SKUPINA	A	B	C	D	E+F	p†
ŠT. PLOSKEV	(N=7)	(N=9)	(N=9)	(N=6)	(N=11)	
MV-m	2030,2	1092,3	231,0	214,2	845,2	***
MV-a	963,1	733,9	114,5	154,8	630,8	***
pH	3,8	3,6	3,9	4,8	5,7	***
Ctot (%)	43,1	41,8	15,5	18,4	37,0	***
Ntot (%)	1,1	1,5	0,7	0,9	1,9	***
C/N	40,0	29,6	22,1	20,7	20,0	***
Ca (cmol(+)/kg)	16,5	14,5	5,3	30,1	84,2	***
Mg (cmol(+)/kg)	4,7	3,2	1,0	2,5	3,9	**
K (cmol(+)/kg)	1,5	1,7	0,6	0,5	1,5	***
Al (cmol(+)/kg)	3,8	4,8	8,7	2,9	0,6	***
Fe (cmol(+)/kg)	2,4	2,2	2,2	0,8	0,1	***
Mn (cmol(+)/kg)	0,02	0,02	0,01	0,06	0,08	**
H (cmol(+)/kg)	32,1	30,9	18,6	4,8	0,6	***
BS (%)	38,3	34,6	18,7	74,8	98,2	***
Globina šote (cm)	175,7	100,0	0,0	0,0	107,3	***

V povprečju so vrstno najmanj pestre ploskve, ki so poraščene z barjanskim ruševjem (15,7 vrst na ploskev). Zaradi razmeroma majhnega števila vrst in izrazitega prevladovanja smreke pa je indeks pestrosti najnižji na ploskvah iz skupine C (H' = 1,52).

DCA1 os je v pozitivni korelaciji z nekaterimi parametri tal, ko so pH, izmenljiva kalcij in mangan, stopnja nasičenosti z bazami (preglednica 1). Značilno je, da evtrična šotna tla nizkega (prehodnega) barja (skupini E in F) vsebujejo veliko bazičnih kationov in med njimi še posebej izstopa kalcij (preglednica 2). Kalcij je pomemben sestavni del apnenca, ki je močno zastopan v širši okolici raziskovanih barij.

Po drugi strani imajo tla ploskev, ki se pojavljajo pri nižjih vrednostih DCA1, nizko vsebnost kalcija, nizko stopnjo nasičenosti z bazami in nizek pH. Hkrati pa imajo visoko vsebnost izmenljivega aluminija, železa in vodika (preglednica 2). Korelacija med njimi in DCA1 osjo je negativna (preglednica 1).

Variabilnost vzdolž DCA2 osi je tesno povezana z vlažnostjo tal (preglednica 1). Vsebnost vode v tleh (MV), vsebnost celokupnega ogljika in globina šotnih plasti so v močni negativni korelaciji z DCA2 osjo. Celotni ogljik in globina šotnih plasti značilno naraščata z naraščajočo vsebnostjo vode v tleh. Posledično pa je tudi razmerje C/N negativno odvisno od DCA2

On average, species diversity is lowest in plots which are overgrown with dwarf pine mire woods (15.7 species per plot). However, the diversity index is lowest in plots from group C (H' = 1.52) due to a relatively low number of species and strong dominance of the spruce.

The DCA1 axis is strongly correlated with several soil parameters such as pH value, exchangeable calcium and manganese and base saturation rate (table 1). It is typical that the eutric peat soil of lowland (transitional) mire (Groups E and F) contains high concentrations of alkaline cations, calcium recording highest scores (table 2). Calcium is an important ingredient of limestone which is quite common in the surroundings of researched mires.

On the other hand, the soil in the plots with lower scores on the DCA1 axis is characterised by low concentrations of calcium, low base saturation rate and low pH values. These soils, however, have a high content of exchangeable aluminium, iron and hydrogen (table 2). The correlation between these elements and the DCA1 axis is negative (table 1).

Variability along the DCA2 axis is strongly correlated with soil humidity (table 1). The water content in the soil (CH), content of total oxygen and the depth of peat layers are all negativelly correlated with the DCA2 axis. Total oxygen and the depth of peat layers increase in line with the water content in the soil. Consequently, the relation C/N also depends on the DCA2 axis. Total carbon content and the

osi. Vsebnost celotnega ogljika in razmerje C/N sta razmeroma visoka v šotnih tleh, ki jih poraščata barjansko ruševje in barjansko smrekovje (preglednica 2). V takih pogojih uspevajo mnoge vrste značilne za globoka šotna tla, kot npr. Oxycoccus palustris, Eriophorum vaginatum, Juncus filiformis, Sphagnum magellanicum, Sphagnum russowii, Sphagnum flexuosum, Sphagnum capillifolium, Sphagnum fallax, Polytrichum strictum (grafikon 2).

Med DCA3 osjo in analiziranimi parametri nismo ugotovili tesnejših odvisnosti (preglednica 1).

Z analizo variance lastnosti tal (preglednica 2) smo ugotovili, da obstajajo značilne razlike med barji in gozdom na mineralnih tleh.

Ugotovili smo očitne razlike v nekaterih lastnostih tal (npr. pH, vsebnost kationov in še posebej izrazito vsebnost kalcija, stopnja nasičenosti z bazami) med obema tipoma smrekovega gozda (C in D).

4 Diskusija

4.1 Ekološko-vegetacijska razmerja

V raziskavi smo se osredotočili predvsem na pojavljanje vrst in njihovo odvisnost od talnih razmer. Ordinacija je dobro razmejila med različnimi barji (poraščeno z ruševjem, s smrekovjem ali s šašovji) in smrekovim gozdom.

Pri oblikovanju strukturno-vegetacijskih vzorcev na barjih igrajo pomembno vlogo različni ekološki gradienti. Mnogi avtorji (npr. Karlin & Bliss 1984, Martinčič & Piskernik 1985, Malmer 1986, Glaser et al. 1990, Gerdol 1995, Jeglum & He 1995, Bragazza & Gerdol 1996, Bragazza 1997, Nordbakken 1996, Wheeler & Proctor 2000, Økland et al. 2001) ugotavljajo, da sta vlažnostni gradient in gradient kislosti oz. alkalnosti tal. med najpomembnejšimi dejavniki, ki vplivajo na vrstno pestrost in razporeditev vegetacije,

Tudi v naši raziskavi se je jasno pokazala razporeditev vrst in vegetacije vzdolž DCA1 osi, ki odraža gradient kislosti/alkalnosti tal. To je tudi povsem v skladu z bimodalno razporeditvijo mahov v odvisnosti od tega gradienta (Gorham & Janssens 1992). Vzdolž DCA1 osi se na eni strani kopičijo vrste iz družine Sphagnaceae (npr. Sphagnum girgensohnii, S. magellanicum, S. russowii, S. flexuosum, S. capillifolium) in na drugi strani vrste, ki spadajo v družino Amblystegiaceae (npr. Drepanocladus cossonii, Campylium stellatum, Calliergon cordifolium, Cratoneuron decipiens).

DCA1 os ločuje mezo-evtrofna nizka barja (poraščena z vegetacijo različnih šašovij od ombro-oligotrofnih barij (visoko barje) z ruševjem in s smrekovjem ter od smrekovega gozda na mineralnih tleh.

C/N relation are relatively high in peat soil, overgrown with dwarf pine mire woods and spruce mire (table 2). Such conditions enable the growth of many species typical of deep peat soil such as Oxycoccus palustris, Eriophorum vaginatum, Juncus filiformis, Sphagnum magellanicum, Sphagnum russowii, Sphagnum flexuosum, Sphagnum capillifolium, Sphagnum fallax, Polytrichum strictum (graph 2).

No close correlation was found between the DCA3 axis and the analysed parameters (table 1).

The analysis of variance for soil parameters (table 2) showed characteristic differences between mires and forests on mineral soil.

There were also several obvious differences in certain soil parameters (e.g. pH, cation content and outstanding calcium content, base saturation rate) between both spruce forest types (Groups C and D).

4 Discussion

4.1 Ecological-vegetation relationships

The main focus of the research was on species ocurrence and the their dependence on soil conditions. Vegetation ordination provided a clear division between various mires (overgrown with dwarf pine, spruce forests or sedges) and spruce forests.

In determining the vegetation structure patterns in mires, various ecological gradients need to be considered. Many authors (e.g. Karlin & Bliss 1984, Martinčič & Piskernik 1985, Malmer 1986, Glaser et al. 1990, Gerdol 1995, Jeglum & He 1995, Bragazza & Gerdol 1996, Bragazza 1997, Nordbakken 1996, Wheeler & Proctor 2000, ¨kland et al. 2001) establish that the humidity gradient and the soil acidity or alkalinity gradient are among the most important elements to determine the diversity of a species and vegetation distribution.

Our research clearly showed distribution of species and vegetation along the DCA1 axis which presents the soil acidity/alkalinity gradient. This finding fully corresponds with the bimodal distribution of mosses in correlation with the soil gradient (Gorham & Janssens 1992). Along the DCA1 axis, species of the family Sphagnaceae (e.g. Sphagnum girgensohnii, S. magellanicum, S. russowii, S. flexuosum, S. capillifolium) concentrate on one side of the axis, whereas on the other side there are concentrations of species of the family Amblystegiaceae (e.g. Drepanocladus cossonii, Campylium stellatum, Calliergon cordifolium, Cratoneuron decipiens).

The DCA1 axis separates meso-eutrophic fens (overgrown with sedge communities) from ombro-oligotrophic mires (raised bog) with dwarf pine mire woods and spruce mire and from spruce forests on mineral soil.

DCA2 os je v tesni povezavi z gradienti vsebnosti vode, vsebnosti celotnega ogljika in razmerja C/N. Vzdolž te osi so progresivno razvrščeni po naslednjem vrstnem redu: barja z ruševjem (visoka barja) v ekstremnih pogojih z visoko vsebnostjo vode v šotnih tleh; barje poraščeno s smrekovjem, nizka barja s šašovji in na vrhu dvorazsežnega ordinacijskega prostora je smrekov gozd na razmeroma suhih mineralnih tleh.

Gradienti reakcije tal, vsebnosti kationov (posebej kalcija) in stopnje nasičenosti z bazami so pomembni dejavniki, ki vplivajo na floristično sestavo rastlinskih združb. Razmeroma pestra floristična sestava na prehodu med barji in gozdom je rezultat heterogenih ekoloških razmer, pri katerih imajo tla posebej pomembno vlogo. Dejavniki, ki pospešujejo vrstno pestrost so predvsem visoki pH, visoka vsebnost kalcija in s tem povezana visoka stopnja nasičenosti z bazami. To so predvsem lastnosti nizkih barij z različnimi šašovji in smrekovih gozdov, ki rastejo na obrobju teh barij. Za visoka barja, kjer močno prevladujejo vrste iz rodu Sphagnum, so značilne nizke vrednosti teh parametrov. Pestrost vrst pada z naraščanjem vsebnosti kislih kationov (Al, Fe and H) v tleh.

Kljub temu, da so barja z ruševjem in barja z smrekovjem v klastrski analizi (Kutnar 2000b) ločena, so značilne vrste teh dveh tipov razmeroma blizu v ordinacijskem prostoru. Razlikovanje teh dveh skupin je predvsem rezultat prevladovanja rušja (Pinus mugo) v prvem in smreke (Picea abies) v drugem. DCA ordinacija vrst (grafikon 2) ne kaže očitnih razlik med tipoma, saj se pojavlja nekaj skupnih vrst (npr. Sphagnum magellanicum), ki imajo v obeh visoko stopnjo zastiranja (priloga 1).

Oba tipa sestavljata mozaično grajene barjanske komplekse, kjer so meje med njima precej zabrisane. Inicialna faza barjanskega smrekovja, s krnjavo, grmičasto smreko (Kutnar & Martinčič 2002), se lahko v obliki raztresenih otočkov pojavlja že med prevladujočim barjanskim ruševjem. Kot kaže lahko rušje raste v nekoliko bolj ekstremnih, ombrotrofnih razmerah kot smreka. Vendar pa zanesljivih vzrokov za izmenjavanje smreke in rušja v ombro-oligotrofnih razmerah še nismo odkrili.

Ugotovili smo značilne razlike med obema tipoma gozda na mineralnih tleh. Smrekov gozd iz skupine C se pojavlja predvsem na različnih podzolih z nizko vsebnostjo kalcija. Zanj je značilna razmeroma majhna vrstna pestrost. V nasprotju z njim pa je smrekov gozd iz skupine D, ki raste na zelo različnih tleh z višjo povprečno vsebnostjo, vrstno bogat. Mnoge ploskve, ki so poraščene s tem tipom gozdne vegetacije, so celo pod nivojem bližnjega barja, zato je vpliv podtalne vode ali sezonskih poplav mnogo bolj izrazit. V skupini D tako prevladujejo oglejena tla (glejsoli).

The DCA2 axis is strongly correlated with the water content gradient, total carbon content gradient and C/N relation gradient. Mire types are distributed along this axis in the following order: dwarf pine mire woods (raised bogs) in extreme conditions with a high content of water in peat soil; spruce mire, sedge mires and, on the top of the two-dimensional ordination system, spruce forest on relatively dry mineral soil.

The gradients of soil reaction, cation content (calcium in particular) and base saturation rate are all important factors which influence the floristic composition of plant communities. Relatively rich floristic composition at the transition between mires and forests results from heterogenic ecological conditions in which soil plays a very important role. The factors promoting species diversity are mainly the following: high pH value, high calcium content and high base saturation rate. These constitute the main characteristics of sedge mires and of spruce forests overgrowing the edges of these bogs. Low values of these parameters are typical of raised bogs with Sphagnum as the dominant plant species. Species diversity decreases as the content of acid cations (Al, Fe and H) in the soil rises.

Although dwarf pine mire woods and spruce mires are treated separately in the cluster analysis (Kutnar 2000b), characteristric species of these two vegetation types are relatively close to each other in the ordination system. The groups are mainly distinguished by an expressed dominance of dwarf pine (Pinus mugo) in the first vegetation type, and the dominance of spruce (Picea abies) in the other. The DCA species ordination (graph 2) shows no obvious differences between the two types, since many species (Sphagnum magellanicum) have a high coverage rate in both vegetation types (Annex 1).

Both types constitute mosaic mire complexes where boundaries between them are barely visible. The initial phase of spruce mire with bush-like spruce trees (Kutnar & Martinčič 2002) may occur in the form of scattered hummocks among the already dominant dwarf pine mire woods. It seems that dwarf pines can also sustain more extreme, even ombro-trophic conditions than spruce. Nevertheless, reliable causes for the exchange of spruce and dwarf pine in ombro-oligotrophic conditions have not been found yet.

Some typical differences between both forest types on mineral soil were identified. The spruce forest of Group C mainly grows on podzol soils with a low calcium content. It is characterised by a relatively low species diversity. On the contrary, the spruce forest of Group D, which grows on various soil types with higher mean clacium content, is rich in species. Many plots on which this type of forest vegetation grows are even below the level of nearby bogs and the influence of groundwater or seasonal floods is therefore even stronger. In Group D, the dominant soil type is greysol.

4.2 Potencialna ogroženost

Pokljuška barja so med razmeroma dobro ohranjenimi barji pri nas in v južnem delu Srednje Evrope. Zaradi majhnosti proučevanih barij so še posebej potencialno ogrožena zaradi različnih negativnih vplivov, ki so običajno posledica človekovega delovanja.

Pri gospodarjenju z gozdom, ki obkroža pokljuška barja, prihaja pogosto do škodljivega poseganja v občutljive sisteme. Še posebej pri spravilu lesa iz gozda lahko prihaja do očitnih in dolgotrajnih mehanskih poškodb na občutljivih šotnih in drugih hidromorfnih tleh (nastale pod vplivom delovanja vode). Zaradi tega bi bilo najprimerneje opustiti sečnjo in spravilo lesa v njihovi neposredni bližini. V njihovem območju je neprimerna tudi množična rekreativna dejavnost, katere posledice so lahko teptanje tal, poškodbe in uničevanje rastlin, odnašanje ogroženih rastlin, vznemirjanje živali, puščanje odpadkov itd.

Tudi redna, nekontrolirana paša na pokljuških barjih lahko povzroči poškodbe šotnih tal in rastlin ter spremembo v kemizmu tal. Na kemizem šotnih tal pa lahko vpliva tudi bližina makadamske ceste in gost promet po njej. V poletnih mesecih se z makadamske ceste proti bližnjim barjem vali prah, v času dežnih padavin in taljenja snega pa se s cestišča odceja vodna raztopina. Prah in vodna raztopina z makadamske ceste, ki vsebujeta karbonate, lahko močno spremenita značaj kislih šotnih tal.

Poleg direktnih zoo-antropogenih vplivov je obstoj barij ogrožen tudi zaradi povsem naravnega razvoja. Barja se lahko postopoma izsušujejo in zaraščajo z gozdom. Zaradi sprememb dejavnikov, ki so odločilni za njihov obstoj, so posredno ogroženi tudi naravni prebivalci barij. Različne vrste, prilagojene na specifične razmere, lahko ob nenadni spremembi izginejo. Predvsem zaradi človekovih posegov v okolje je pri nas ogrožena barjanska flora in vegetacija, na kar opozarjajo mnogi avtorji (Mayer & Zupančič 1982, Wraber & Skoberne 1989, Martinčič 1992, 1996, Zupančič 1996).

Dolgoročne nevarnosti za obstoj pokljuških in drugih barij so lahko tudi posredne. Ob postopnem globalnem segrevanju našega planeta se lahko spreminja tudi regionalna klima in z njo povezan vodni režim. Ob višjih temperaturah in intenzivnejši evapotranspiraciji bi se lahko znižal nivo talne vode, s tem bi se postopoma izsušila barjanska tla. Ob pričakovanih vse pogostejših ekstremnih vremenskih dogodkih (npr. suša in obilne padavine, močna neurja) bo proces degradacije šotnih plasti močno pospešen. Toplejše obdobje bi potencialno pomenilo izginjanje vrst z barjanskih površin, prilagojenih na ekstremne razmere, in s tem vdor mezofilnih vrst, ki uspevajo v bolj blagih ekoloških razmerah.

4.2 Potential risks

The Pokljuka bogs range among well-preserved bogs in Slovenia and in the southern part of Europe. Owing to their small size, they are potentially at risk from various negative impacts, usually resulting from human action.

The management of forests which surround the Pokljuka bogs occasionally involves some harmful interventions into the highly sensitive mire systems. Timber logging, for example, can cause severe and long-lasting mechanical damage to the sensitive peat soil and other hydromorphic soils (created as a result of water activity). The most appropriate course of action would therefore be to discontinue wood harvest and transport in the immediate vicinity of the mires. This area is also burdened by inappropriate mass recreation activities which can cause soil trampling, damage and destruction of plants, removal of engangered plants, disturbance of animals, littering, etc.

Besides, regular and uncontrolled grazing on the Pokljuka bogs may result in damage to peat soil and plants and cause changes in the soil chemism. The chemism of peat soil is also affected by the nearby gravel road and dense traffic. In summer months, clouds of dust fly towards the mires from the gravel road, and during rain and snow melt a suspension of water and gravel drains towards the wetlands. Dust and the water suspension from the gravel road both contain carbonates and can severely change the character of acidic peat soils.

In addition to direct zoological and antropogenic impacts, the mires are also threatened by natural development. Gradually, they may dry out or become overgrown with forests. Since the factors essential for the survival of mires are changing, natural mire inhabitants are faced with an indirect threat. Any sudden change can cause disappearnce of various species adapted to specific mire conditions. We are reminded by many authors that human interventions in Slovenia pose a threat to mire vegetation (Mayer & Zupančič 1982, Wraber & Skoberne 1989, Martinčič 1992, 1996, Zupančič 1996).

But long-term risks for the existence of mires on the Pokljuka plateau and elsewhere in Slovenia can also be indirect. Gradual global warming of our planet may change the regional climate and the related water regime. Higher temperatures and more intensive evapotranspiration could cause the level of groundwater to drop, leading to a gradual drainage of bog floor. Judging from the increased frequency of extreme natural phenomena (e.g. drought and heavy rains, severe storms) the process of peat layer degradation will be much faster in the future. Warmer climate could cause the species adapted to extreme conditions to gradually disappear from bog areas, and be replaced by mesophillic species thriving in mild ecological conditions.

Vegetation changes may also result from peat growth, drainage of peat layers and, consequently, erosion (Martinčič, 2002).

In addition to changes in water regime, mires are threatened by potential changes in the chemism. The

Do vegetacijskih sprememb lahko prihaja tudi zaradi rasti šote, osuševanja teh plasti in posledične erozije (Martinčič 2002).

Poleg spremembe vodnega režima tiči potencialna nevarnost tudi v spremembi kemizma barij. Zaradi vnosa hranil v te sisteme se spreminja njihov trofični (prehranski) značaj in s tem povezani mnogi osnovni pogoji za njihov obstoj. Številne raziskave namreč kažejo, da evtrofikacija mokrišč in barij povzroča spremembo vrstne sestave vegetacije, zmanjšuje vrstno pestrost in povzroča izgubo redkih, ogroženih vrst (Bridgham et al. 1996, Bollens, Güsewell & Klötzli 1998, Bedford, Walbridge & Aldous 1999).

Pokljuška in ostala slovenska barja sodijo med najjužnejša šotna barja v Evropi. Zaradi njihove lege na robu areala razširjenosti šotnih barij so še posebno ogrožena, kar jim daje še večji pomen. Zaradi redkih, ogroženih rastlinskih vrst in rastlinskih združb ter zaradi njihovih specifičnih ekoloških pogojev so upravičena do načrtnega varovanja. Varstvo barij, ki ima za cilj njihovo ohranitev v čimbolj naravni obliki, mora zlasti stremeti k zmanjšanju vseh obstoječih in potencialnih nevarnosti za njihov obstoj.

Kljub temu, da manjša barja na Pokljuki predstavljajo zanimive biotope in na malopovršinski način prispevajo k členitvi gozdnega prostora, so pogosto prezrta. Zaradi skromnih razsežnosti so zagotovo še bolj ogrožena kot večja barja in se zaradi tega tudi intenzivneje spreminjajo.

S formalnim varstvom barij bi se morala povečevati tudi dejanska skrb zanje in nadzor nad posegi v njihovo širše zaledje. To bi konkretno pomenilo tudi omejevanje prometa in rekreativne dejavnosti v neposredni bližini. Ker pa realno gledano širšega območja barij ne moremo zapreti, bi ponekod morali poseči tudi z ukrepi aktivnega varovanja.

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input of nutrients in these systems causes their trophic (nutrient) character to change as well, together with many other fundamental conditions for the existence of bogs. Numerous research analyses show that eutrophication of wetlands and mires causes changes in the species structure of vegetation, decreases species diversity and causes disapperance of rare, engangered species (Bridgham et al. 1996, Bollens, Güsewell & Klötzli 1998, Bedford, Walbridge & Aldous 1999).

The Pokljuka bogs and other bogs in Slovenia are the southernmost peat bogs in Europe. Owing to their location on the very edge of the peat bog distribution area, they are even more endangered, and even more precious. Slovene mires are entitled to planned protection because of rare, endangered plant species and plant communities and their specific ecological conditions. Mire conservation, the aim of which is to preserve mires in their natural form, must strive to reduce all the existing and potential risks to their existence.

Small bogs on the Pokljuka plateau are often neglected although they possess interesting biotopes and contribute to the small-scale division of a forest environment. Small in size, they are even more at risk than larger bogs and frequently undergo more intensive changes.

Formal mire protection should improve the care and introduce control over the interventions in their catchment area. In practice, this would mean putting limitations on traffic and recreation activities in their immediate vicinity. Realistically speaking, the area of mires cannot be closed to the public, and might therefore require active protection measures.

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PRILOGA 1 /APPENDIX 1

Vertikalne vegetacijske plasti po vegetacijskih tipih (skupinah). Predstavljeni so: število ploskev (N) v vsakem tipu (skupini), frekvenca pojavljanja (n) in povprečna stopnja zastiranja (v %) za 97 rastlinskih vrst po vegetacijskih tipih (skupini E in F sta združeni).

Vertical layer vegetation of the different vegetation types. Number of sample plots (N) of each vegetation type, frequency of occurrence (n), and mean cover value (in %) of 97 species in vegetation types (types E and F are jointed) are presented.

OZNAKA SKUPINE	BARJE Z RUŠEVJEM dwarf-pine mires		BARJE S SMREKOVJEM spruce mires		SMREKOV GOZD spruce forest		SMREKOV GOZD spruce forest		NIZKA (PREHODNA) BARJA S ŠAŠOVJI sedge fens	
SINTAKSONOMSKA OZNAKA	Pino mugi-Sphagnetum		Sphagno girgensohnii-Piceetum var. geogr. Carex brizoides				Rhytidiadelpho lorei-Piceetum		Sphagno-Caricetum rostratae Caricetum davallianae Trichophoretum alpini	
SKUPINA	A		B		C		D		E+F	
ŠT. PLOSKEV	(N=7)		(N=9)		(N=9)		(N=6)		(N=11)	
	n	cover (%)	n	cover (%)	n	cover (%)	n	cover (%)	n	cover (%)
DREVESNA in GRMOVNA PLAST Tree and shrub layer:										
Picea abies	7	12,9	9	43,3	9	58,7	6	79,2	9	13,1
Pinus mugo	6	52,6	1	15,0	-	-	-	-	-	-
ZELIŠČNA PLAST Herb layer:										
Agrostis capillaris	-	-	-	-	-	-	3	1,3	7	0,5
Agrostis stolonifera	-	-	-	-	-	-	2	0,5	2	0,5
Anemone nemorosa	-	-	-	-	-	-	6	5,0	8	3,3
Calamagrostis arundinacea	-	-	-	-	3	12,8	1	0,5	-	-
Calamagrostis villosa	-	-	2	7,8	2	1,8	3	5,3	1	62,5
Caltha palustris	-	-	1	15,0	-	-	2	15,0	8	21,9
Cardamine pratensis agg.	-	-	-	-	-	-	-	-	5	0,5
Cardamine trifolia	-	-	-	-	-	-	3	7,0	-	-
Carex brizoides	5	4,4	7	5,7	2	9,0	3	0,5	6	15,4
Carex davalliana	1	0,5	-	-	-	-	-	-	7	17,1
Carex digitata	-	-	-	-	1	0,5	2	1,8	-	-
Carex echinata	1	0,5	2	0,5	-	-	-	-	6	0,9
Carex flava agg.	-	-	-	-	-	-	-	-	7	7,4
Carex nigra	6	4,2	9	1,6	2	1,8	-	-	7	1,2
Carex pauciflora	6	6,6	3	0,5	-	-	-	-	1	0,5
Carex rostrata	1	0,5	-	-	1	0,5	-	-	8	35,4
Chaerophyllum hirsutum	-	-	-	-	-	-	4	5,4	5	15,8
Crepis paludosa	1	0,5	-	-	-	-	2	0,5	8	6,6
Cruciata glabra	-	-	-	-	-	-	4	1,1	-	-
Dactylorhyza maculata	-	-	-	-	-	-	1	0,5	8	0,8
Deschampsia cespitosa	-	-	-	-	-	-	3	1,3	3	1,3
Dryopteris expansa	-	-	1	0,5	2	1,8	1	0,5	-	-
Equisetum palustre	1	3,0	-	-	-	-	-	-	7	5,7
Equisetum sylvaticum	-	-	-	-	-	-	3	6,2	4	1,1
Eriophorum latifolium	-	-	-	-	-	-	-	-	9	4,0
Eriophorum vaginatum	5	19,2	6	3,8	-	-	-	-	-	-
Euphrasia rostkoviana	-	-	-	-	-	-	-	-	6	2,6
Festuca heterophylla	-	-	-	-	-	-	1	0,5	4	0,5
Filipendula ulmaria	-	-	-	-	-	-	1	0,5	2	1,8
Fragaria vesca	-	-	-	-	-	-	3	5,3	-	-
Galium palustre	-	-	-	-	-	-	-	-	5	0,5
Geum rivale	-	-	-	-	-	-	-	-	3	0,5

Gymnocarpium dryopteris	-	-		-	-		2	0,5		4	0,5		2	1,8
Hieracium sylvaticum	-	-		-	-		-	-		3	1,3		-	-
Huperzia selago	-	-		-	-		2	0,5		1	0,5		-	-
Juncus filiformis	2	7,8		1	0,5		1	0,5		-	-		-	-
Luzula luzulina	-	-		2	0,5		6	0,5		5	0,5		1	0,5
Luzula luzuloides	-	-		-	-		4	0,5		2	1,8		-	-
Luzula pilosa	1	3,0		3	0,5		8	2,1		6	0,9		2	0,5
Lycopodium annotinum	-	-		-	-		8	7,6		-	-		-	-
Maianthemum bifolium	2	7,8		2	1,8		1	0,5		5	6,8		6	1,3
Melampyrum sylvaticum	4	1,8		2	0,5		-	-		4	0,5		4	0,5
Molinia caerulea	1	3,0		-	-		-	-		-	-		1	3,0
Nardus stricta	1	0,5		-	-		-	-		1	0,5		5	1,0
Oxalis acetosella	-	-		-	-		7	1,9		5	9,4		1	0,5
Oxycoccus palustris	7	5,4		1	0,5		-	-		-	-		3	0,5
Parnassia palustris	-	-		-	-		-	-		1	0,5		5	1,5
Pinguicula vulgaris	-	-		-	-		-	-		-	-		4	1,8
Poa alpina f. vivipara	-	-		-	-		1	0,5		5	0,5		-	-
Polygala vulgaris	-	-		-	-		-	-		-	-		3	2,2
Potentilla erecta	1	15,0		1	0,5		-	-		1	3,0		11	18,6
Ranunculus acris	-	-		-	-		-	-		-	-		7	6,1
Trichophorum alpinum	-	-		-	-		-	-		-	-		3	22,0
Trifolium pratense	-	-		-	-		-	-		1	0,5		2	1,8
Trifolium repens	-	-		-	-		-	-		1	0,5		2	0,5
Vaccinium myrtillus	7	34,8		9	48,7		6	31,8		6	27,3		6	5,8
Vaccinium vitis-idaea	7	27,9		8	10,0		3	1,3		5	10,8		8	3,3
Valeriana dioica	-	-		-	-		-	-		1	0,5		7	7,8
Veronica officinalis	-	-		-	-		-	-		3	0,5		-	-
Viola biflora	-	-		-	-		-	-		2	15,0		2	1,8
MAHOVNA PLAST Moss layer:														
Aulacomnium palustre	1	0,5		-	-		-	-		-	-		8	5,1
Bazzania trilobata	-	-		1	0,5		3	1,3		-	-		-	-
Bryum pseudotriquetrum	-	-		-	-		-	-		-	-		7	19,1
Calliergon cordifolium	-	-		-	-		-	-		-	-		3	5,3
Calliergon stramineum	-	-		-	-		-	-		-	-		6	5,8
Calliergonella cuspidata	1	0,5		1	0,5		-	-		-	-		2	0,5
Campylium stellatum	-	-		-	-		-	-		-	-		4	1,1
Cetraria islandica	-	-		-	-		3	2,2		1	0,5		-	-
Cladonia furcata	-	-		-	-		5	1,0		2	0,5		-	-
Climacium dendroides	-	-		-	-		-	-		3	0,5		7	3,3
Cratoneuron decipiens	-	-		-	-		-	-		-	-		3	2,2
Dicranum polysetum	1	0,5		6	0,9		6	12,8		1	0,5		-	-
Dicranum scoparium	-	-		2	0,5		2	7,8		6	0,9		-	-
Drepanocladus cossonii	-	-		-	-		-	-		-	-		4	17,3
Homalothecium nitens	-	-		-	-		-	-		-	-		4	8,4
Hylocomium splendens	1	0,5		4	1,1		3	0,5		3	12,8		3	2,2
Pedinophyllum interruptum	-	-		-	-		2	0,5		2	1,8		1	0,5
Plagiochila asplenioides	-	-		-	-		-	-		2	9,0		1	0,5
Plagiomnium rostratum	-	-		-	-		-	-		-	-		6	9,5
Plagiothecium laetum	-	-		-	-		3	0,5		-	-		-	-
Plagiothecium undulatum	-	-		2	0,5		1	0,5		-	-		-	-
Pleurozium schreberi	2	0,5		3	1,3		1	0,5		4	14,0		4	1,1
Polytrichum commune	1	3,0		9	10,6		1	3,0		-	-		1	0,5
Polytrichum formosum	-	-		-	-		9	2,4		3	1,3		-	-
Polytrichum strictum	4	8,4		1	0,5		-	-		-	-		4	1,1
Rhizomnium punctatum	-	-		-	-		2	0,5		1	0,5		2	7,8
Rhytidiadelphus loreus	-	-		2	1,8		7	0,9		3	1,3		-	-
Rhytidiadelphus triquetrus	-	-		1	0,5		3	1,3		5	18,7		6	19,8

Sphagnum capillifolium	4	11,0		6	4,2		-	-		-	-		3	5,3
Sphagnum girgensohnii	1	0,5		8	19,3		5	25,3		-	-		2	1,8
Sphagnum magellanicum	7	56,1		9	19,8		1	3,0		-	-		4	8,4
Sphagnum flexuosum	6	18,5		4	14,0		1	15,0		-	-		4	4,8
Sphagnum fallax	1	3,0		3	18,5		-	-		-	-		-	-
Sphagnum russowii	4	14,6		3	10,2		1	3,0		-	-		1	3,0
Sphagnum squarrosum	-	-		1	37,5		1	0,5		-	-		1	0,5

PRILOGA 2 / APPENDIX 2

Vegetacija raziskovalnih ploskev po izbranih barjih (slika 1)

Vegetation of research plots on the selected mires (figure 1)

Legenda / Legend:
Pino mugi-Sphagnetum russowii: Pin-Sphrus
Piceo-Sphagnetum flexuosi: Pic-Sphfle
Sphagno-Piceetum var.geogr. Carex brizoides: Sph-Pic_Cbri;
Sphagno-Caricetum rostratae: Sph-Cros
Caricetum davallianae: Cdav
Trichophoretum alpini: Talp
Rhytidiadelpho lorei-Piceetum typicum: Rl-Pic_typ
Rhytidiadelpho lorei-Piceetum sphagnetosum girgensohnii: Rl-Pic_sphgir
Rhytidiadelpho lorei-Piceetum cardaminetosum: Rl-Pic_card

BARJE mire	Pl. 1 plot 1	Pl. 2 plot 2	Pl. 3 plot 3	Pl. 4 plot 4	Pl. 5 plot 5	Pl. 6 plot 6	Pl. 7 plot 7
bGP	Sph-Pic_Cbri	Sph-Pic_Cbri	Sph-Pic_Cbri	Sph-Pic_Cbri	Rl-Pic_sphgir	Rl-Pic_sphgir	Rl-Pic_sphgir
b24	Cdav	Pic-Sphfle	Sph-Cros	Sph-Cros	Cdav	Rl-Pic_card	Rl-Pic_card
b25	Rl-Pic_sphgir	Rl-Pic_sphgir	Sph-Cros	Sph-Cros	Cdav	Rl-Pic_card	Rl-Pic_card
b8	Sph-Pic_Cbri	Sph-Pic_Cbri	Pin-Sphrus	Pin-Sphrus	Pin-Sphrus	Sph-Pic_Cbri	Rl-Pic_typ
b12	Pin-Sphrus	Pin-Sphrus	Pin-Sphrus	Sph-Pic_Cbri	Sph-Pic_Cbri	Rl-Pic_sphgir	Rl-Pic_typ
b11	Rl-Pic_card	Sph-Cros	Sph-Cros	Talp	Rl-Pic_card	Rl-Pic_typ	Rl-Pic_typ

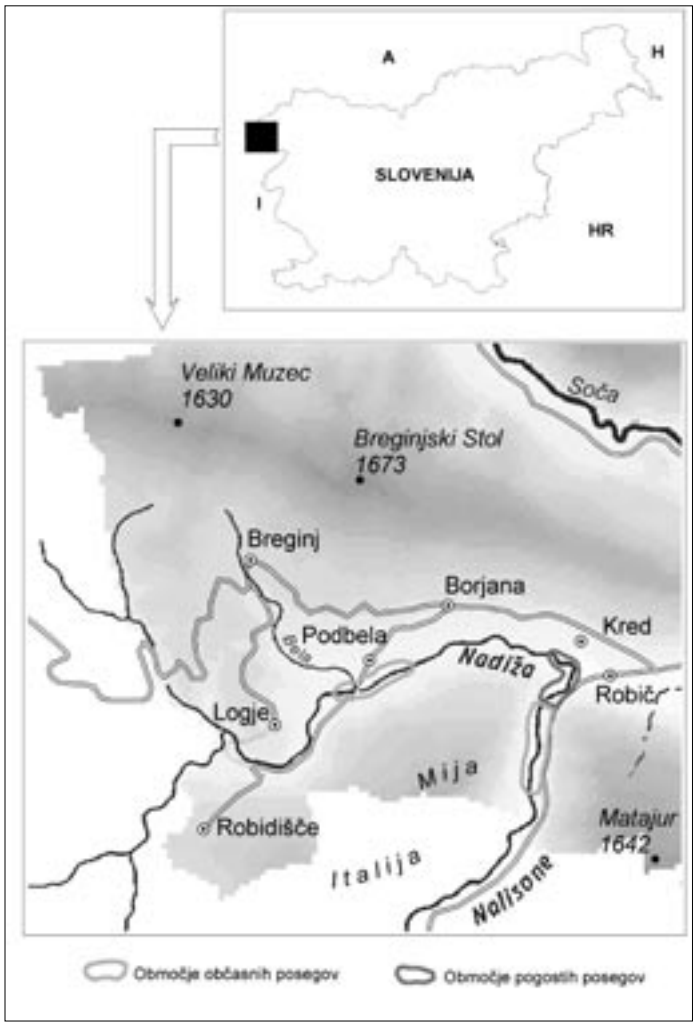
Boško ČUŠIN

NADIŽA - NARAVNI SPOMENIK

Nadiža - natural monument

V prispevku obravnavam reko Nadižo kot pravno-formalno zavarovan objekt narave. Podana so najpomembnejša dejstva, ki opredeljujejo to reko kot naravni spomenik. Opisane so redke rastlinske vrste in našteti habitati, ki jih obravnava habitatna direktiva. Izpostavil sem neprimerne vodnogospodarske in druge posege v strugo reke in ugotovil, da se pri tem premalo upoštevajo ugotovitve znanstvenikov in mnenja naravovarstvene stroke.

The article studies the Nadiža River as a legally and formally protected natural object. The most important facts defining the river as a natural monument are mentioned. Some rare plant species are described in the article, and a list is given of those habitats which are discussed within the habitat directive. I paid special attention to the inappropriate use of water and water management and determined that these interventions do not consider enough scientific findings, nor do they pay regard to the judgement of environmentalists



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1 Geomorfologija reke

Nadiža je osrednji vodotok v Breginjskem kotu. Povirno območje Nadiže so južna pobočja Stolovega pogorja med Malim Muzcem in Breškim Jalovcem (Breška gora). Odtod se stekajo številni potoki in hudourniki, ki se postopoma združijo v Beli in Črni potok (slednjemu se pod Ladino pridružita še dva, Plazi potok in Globotnik). Šele ko se združita Beli in Črni potok, dobi vodotok ime Nadiža. To se zgodi 1 km gorvodno od Mosta na Nadiži (Rutar 1882). Od tam do sotočja z Legrado je Nadiža mejna reka z Italijo. Pri Mostu na Nadiži so edina večja prodišča v njenem zgornjem toku. Tukaj se vanjo izliva potok Namlen, ki priteče iz Plestišč. Nadiža kmalu izgine v soteski, katere prepadna pobočja so zgrajena iz fliša. Pod Gradecom se ji pridruži vodnata Legrada. Do semkaj teče Nadiža v skoraj premi črti od severa proti jugu. Pod Logmi (Gnjilo skalo) naredi oster ovinek proti vzhodu. Od tukaj naprej se menjavajo tolmuni in brzice, ki jih je reka izdolbla v apnenčevi breči in laporjih. Ozka dolina se konča v koritih pod kamnitim Napoleonovim mostom. Tukaj se dolina Nadiže začne širiti, reka ustvarja obsežna prodišča in otočke proda, na katerih se razvija raznolika vegetacija. Pri Kredu se še enkrat prebije skozi slikovita korita in nadaljuje pot proti vzhodu. Kmalu pa spet zavije na jug, tokrat v več kot 1000 m globoko deber med Mijo in Matajurjem. Tako ima tok Nadiže v Sloveniji obliko črke S. Po nekaj kilometrih prečka državno mejo z Italijo. Ozka dolina se nadaljuje do Podbonesca (Pulfero), na kar se njena struga poglobi v aluvialne naplavine Furlanske nižine. Pri Manzanu se izliva v Ter, ki se malo pred Tržičem (Monfalcone) pridruži Soči. Čeprav ima Nadiža v celotnem toku skozi Slovenijo precej hudourniški značaj jo lahko označimo kot predalpsko reko. To sklepamo iz značilnega nihanja vodostaja med letom, ki ga opisujemo z rečnim režimom. Nadiža ima namreč t. i. snežno-dežni režim (nivo-pluvialni), ki ga označujeta dva maksimuma in dva minimuma. Prvi višek, ki je pozno pomladi (maja, včasih junija), je ponavadi višji od jesenskega (novembra). Zimski minimum (januarja ali februarja) je vedno nižji od poletnih nizkih vod (poletnega minimuma), ponavadi avgusta (Kolbezen & Pristov 1998). Zaradi opustitve košnje in pašništva se je delež gozdnih površnih v Kotu precej povečal. Zato sklepam, da se je odtočni količnik (razmerje med količino padavin in količino vode, ki odteče po strugi) za Nadižo precej zmanjšal. Verjetno so zato tudi velike povodnji dosti redkejše kot nekoč.

2 Zakonske osnove varovanja

Reka Nadiža je zavarovana kot naravni spomenik od izvira do Mednarodnega mejnega prehoda Robič, se pravi v celotnem toku v Sloveniji (Uradno glasilo občin Ajdovščina, Nova Gorica in Tolmin, št. 5 - Nova Gorica, 6. junij 1990). Zavarovana je na podlagi 18. in

1 Geomorphology of the river

The Nadiža river is the main water course in the area called Breginjski kot. The Nadiža drainage area is the southern slopes of the Stol mountain group between Mali Muzec and Breški Jalovec (Breška gora). From here numerous streams and torrents flow, gradually joining their powers into the streams Beli potok and Črni potok (below Ladina, the latter is joined by another two brooks, the Plazi potok and the Globotnik). Only after the confluence of the Beli potok with the Črni potok, the water course is named Nadiža. The confluence is located 1 km upstream from Most na Nadiži (RUTAR 1882). From there to the confluence with the Legrada, the Nadiža flows along the state border with Italy. The only broad gravel flats in the upper part of the river course are at Most na Nadiži. Flowing in from Plestišča, the Nadiža is here met by the brook Namlen. Soon afterwards, it disappears in a gorge with precipitous flysch slopes. Below Gradec, it is joined with the watery Legrada. Up to this point, the course of the Nadiža resembles a straight line running in the north-south direction. At Gnjila skala the river makes a sharp turn to the east, and flows dowstream, ITS river pools exchanging with rapids it has cut in the limestone breccia and marl. The narrow valley ends in the basins below the Napoleon's Bridge. The Nadiža valley widens, creating broad gravel flats and islets that harbour diverse vegetation. At Kredo, the river fights its way again through picturesque basins and continues on its way towards the east. Soon, it makes another turn south, this time cutting its course into the 1000-metre deep gorge between Mija and Matajur. The course of the Nadiža in Slovenia is S-shaped. A few kilometres further downstream, the river crosses the state border with Italy. The narrow valley continues to Podbonesco (Pulfero) where the river cuts deeper into the alluvial deposits of the Friuli Plain. At Manzano, the Nadiža meets the Ter which flows into the Soča near Tržič (Malfalcone). Although the Nadiža has an expressed torrential character throughout Slovenia, it can be classified as a prealpine river because of the typical water level changes during the year or the water regime. The Nadiža has the snow-rain regime (nivo-pluvial regime), characterised by two maximums and two minimums. The first maximum, in late spring (in May, sometimes June), is normally higher than the autumn maximum (in November). The winter minimum (in January and February) is always lower than the summer minimum, which is usually in August (Kolbezen & Pristov 1998). Discontinuation of grazing and pastoral economy has resulted in an increase in the proportion of forest area in Kot. This led me to conclude that the Nadiža discharge coefficient (the ratio between the quantity of rain and the quantity of water that discharges along the riverbed) has reduced significantly. This might also be the reason why severe floods are much less frequent today than in the past.

2 Legal grounds for protection

The Nadiža is protected as a natural monument from its source to the international border crossing Robič, that is the entire river course in Slovenia (Official Newsletter of the Municipalities Ajdovščina, Nova Gorica and Tolmin, No. 5

19. člena Zakona o naravni in kulturni dediščini (Uradni list RS, št. 1/81). Ima status geomorfološke, hidrološke in botanične naravne dediščine za katere veljajo predpisani varstveni režimi (15, 18. in 19. člen Odloka, Uradno glasilo št. 5, N. Gorica, 6. Junij 1990). Po tem odloku so dovoljeni nekateri posegi v ekosistem reke, vendar le v soglasju z Zavodom za varstvo naravne in kulturne dediščine v Novi Gorici (zdaj MOPE ARSO Zavod za varstvo narave OE Nova Gorica).

3 Naravna bogastva

Dolina Nadiže je znana po botaničnih redkostih. Kernerjev mleček (Euphorbia kerneri), kljunastoplodna lanika (Thesium rostratum) in polegla medvejka (Spiraea decumbens) so vrste, ki v Sloveniji rastejo le v Breginjskem kotu (T. Wraber 1969, Wraber, T. & Skoberne 1989, • ušin 2001a). Kot floristično posebnost v Nadiški dolini moram omeniti še dve endemični rastlini: Berinijev otavčič (Leontodon berinii) in Brumatijev otavčič (Leontodon hispidus ssp. brumatii), vrsti, ki sta sicer znani tudi iz doline Soče (T. Wraber 1996, • ušin 2001a, • ušin & Dakskobler 2001). Pred leti sem v mrtvici Nadiže pod Borjano našel Schuttleworthov rogoz (Typha schuttleworthii), rastlino ki je uvrščena v seznam strogo zavarovanih rastlin po Bernski konvenciji. Berinijev jajčar in alpska hrustavka (Chondrilla chondrilloides), ki jo je pri Robiču nabral Zirnich (Mezzena 1986), sta uvrščeni v ranljive vrste slovenske flore. Vse ostale vrste pa sodijo v kategorijo redkih rastlin slovenske flore.

Zaščita prej naštetih vrst je seveda možna le, če varujemo njihova rastišča. Kljunastoplodna lanika in polegla medvejka rasteta tudi na dolomitnih, erodibilnih območjih na Prekopi in v Plazeh, tako da ti dve vrsti nista ogroženi. Tudi Brumatijev otavčič ni ogrožen, saj raste na velikih rečnih balvanih in na ostenjih v vlažnih soteskah, kamor človek za zdaj še ne posega. Drugače je s Kernerjevim mlečkom in Berinijevim otavčičem. Njihova rastišča so umirjene prodne nasipine. Če so prodišča motena prepogosto, kar se dogaja npr. pri kopanju gramoza, se na njih lahko razvijejo le sestoji terofitov (opazil sem, da prevladujejo vrste iz rodov Polygonum in Galeopsis). Da bi se razvile združbe trajnic (npr. ass. Leontodonti berini-Chondrilletum) in vrbišča, je potrebno več časa od ene do druge motnje (velike povodnji so vsakih nekaj let oziroma desetletij).

Pred leti je v dolini Nadiže Biološki inštitut ZRC SAZU začel bazične raziskave rastlinstva (vegetacije). Začetne raziskave so pokazale, da je tudi glede rastlinstva Nadiža edinstveni ekosistem. Verjetno je lega med alpskim in submediteranskim območjem na eni strani ter med ilirskim in srednjeevropskim prostorom na drugi strani botrovala uspevanju v znanosti še neopisane vegetacije. Opisali smo geografsko varianto grmišča sive vrbe z ogrskim grabljiščem (Šilc & • ušin 2000), ki sta jo tržaška fitocenologa Oriolo in Poldini

– Nova Gorica, 6. 6. 1990). It is protected under Articles 18 and 19 of the Natural and Cultural Heritage Act (Official Gazette of the RS, No. 1/81). It was awarded the status of geomorphological, hydrologic and botanical natural heritage to which the prescribed protective regimes apply (Articles 15, 18 and 19 of the Decree, Official Newsletter No. 5, Nova Gorica, 6. 6. 1990). The decree allows certain interventions into the river ecosystem, but only if these are approved by the Institute for the Protection of Natural and Cultural Heritage, Nova Gorica office (now Nature Protection Agency Nova Gorica).

3 Natural assets

The Nadiža valley is famous for its botanical rarities. Euphorbia kerneri, Thesium rostratum and Spiraea decumbens are the plant species which in Slovenia only grow in Breginjski kot (T. Wraber 1969, Wraber, T. & Skoberne 1989, • ušin 2001a). Two more plants growing in the Nadiža valley are classified as endemic species: Leontodon berinii and Leontodon hispidus ssp. brumatii which can also be found in the Soča valley (T. Wraber 1996, • ušin 2001a, • ušin & Dakskobler 2001). By a dead Nadiža branch below Borjana I found Typha schuttleworthii, a plant which is listed as a strictly protected plant species under the Bern Convention. Leotondon berinii and Chondrilla chondrilloides, which was picked by Zirnich near the broder crossing Robič (Mezzena 1986), are classified among sensitive plant species of Slovene flora. All the other species fall within the category of rare plant species of Slovene flora.

The mentioned plant species can only be conserved through protection of their growing sites. Thesium rostratum and Spiraea decumbens also grow on dolomite, erodible areas on Prekopa and in Plaze and are therefore not threatened. Leontodon hispidus ssp. brumatii is not a threatened species either since it grows on large boulders and on rocks in steep gorges which are, for the time being, safe from human intervention. The situation is more serious for Euphoria kerneri and Leotondon berinii. They grow on stable gravel mounds. If gravel banks are frequently disturbed through activities like gravel digging, therophyte communities may develop on them (I have noticed that the dominant therophyte species were those of the orders Polygonum and Galeopsis). Therophyte communities (e.g. ass. Leontodonti berini-Chondrilletum) and willow stands develop only if a long period of time passes between two major interventions (severe floods happen every couple of years or decades).

A few years ago, the Institute of Biology (SRC SASA) started with fundamental research on plant life (vegetation). Initial studies have shown that the Nadiža is a unique ecosystem also in terms of vegetation. The location between the alpine and submediterranean regions on the one side and the Illyric and Central European regions on the other side may have caused the flourishing of vegetation which had previously not been scientifically recorded. We described a geographic variant of grey willow and Knautia drymeia drymeia (ŠILC & ČUŠIN 2000) which the Trieste phytocenologists Oriolo and Poldini (2002) described

(2002) v obsežni analizi podobnih fitocenoz spoznala za ekološko posebnost na bolj evtrofnih in mezofilnih rastiščih ter jo opredelila kot posebno subasociacijo (Salicetum incano-purpureae petasitetosum hybridi). Druga posebnost so prodišča, na katerih so kljub izrazito inicialni pedosferi našle svoj dom številne rastline (na 14 popisnih ploskev smo zapisali več kot 100 rastlinskih vrst). Opisana združba pasje črnobine s snežnobelim repuhom (Epilobio-Scrophularietum caninae petasitetosum paradoxi, • ušin 2001b) je odraz ugodnega podnebja, kjer se sicer še čutijo alpski vplivi, in specifične kamninske sestave prodnikov (mešanica apnenca, glinavcev in peščenjakov). Tudi suha travišča, ki so se razvila kot oaze med termofilnimi grmišči, so rastlinska posebnost. Za zdaj jih še nismo sintaksonomsko opredelili, so pa floristično pestra. Tukaj rastejo vrste, značilne za subalpinska travišča (npr. Sesleria coerulea), in številne termofilne vrste nižjih leg (npr. Fumana procumbens). Geomorfološka lastnost Nadiške doline, da ima široko in ravno dno, nam omogoča, da istočasno spremljamo več različnih fitocenoz v različnih sukcesijskih stadijih (npr. inicialne sestoje sive vrbe, visoke 0,5 m, in gozdnate sestoje, kjer sive vrbe dosežejo 10 m višine). Na mladih rečnih terasah pa so se razvili logi, ki smo jih uvrstili v novo asociacijo belogabrovih gozdov (Carici albae-Carpinetum betuli, • ušin 2002). Vse naštete fitocenoze in njihova rastišča so uvrščeni v seznam evropsko pomembnih habitatov, katerih varstvo zahteva oblikovanje posebno zavarovanih območij (Council Directive 92/43 EEC)

Tukaj sem omenil le del vednosti o naravnih bogastvih Nadiške doline, ki so jih prispevale botanične vede. V literaturi zasledimo tudi precej podatkov o geologiji in geografiji tega območja (pomembna je npr. ugotovitev našega priznanega geologa Stanka Buserja, da Nadiža več proda erodira kot akumulira), še veliko pa bodo morale povedati druge biološke vede, predvsem zoologija.

4 Turistične dejavnosti in adventivke

Nadiža je poleti cilj številnih kopalcev, saj je za alpsko reko razmeroma topla (ponavadi se segreje na okoli 22 °C). Takrat je tudi precej obremenjena z odpadki, kar pa je moteče predvsem z estetskega vidika. Zaenkrat obstaja le eden turistični objekt v dolini Nadiže. To je kamp Nadiža v Podbeli, ki je odprt poleti in katerega dejavnosti doslej niso bistveno vplivale na naravo v širši okolici. Nekoliko skrbi nenadzorovana širitev kampa na več lokacij in ideje o gradnji zdraviliškega centra, saj bi območje stežka preneslo še večje obremenitve.

Turistične dejavnosti vplivajo negativno na rastlinstvo območja z dveh vidikov. Po eni strani se zaradi regulacije reke (da bi zavarovali turistične objekte) zmanjšuje njena dinamika in je manj prostora za vrste, ki drugod ne morejo rasti zaradi konkurence. Inicialna

in an extensive analysis of similar phytocenoses as an ecological peculiarity on eutrophic and mesophillic growing sites and defined it as a special Salicetum incano-purpureae petasitetosum hybridi subcommunity. Another peculiarity of the area are gravel flats which despite pedosphere, support numerous plants (over 100 plant species were recorded on 14 research plots) The Epilobio-Scrophularietum caninae petasitetosum paradox community (• ušin 2001b) is a result of favourable climate in which the alpine influence is still felt, as are the influences of specific gravel structure (mixture of limestone, clay and sandstone). Dry grasslands having developed as oases between thermophille bushes are another distinctive feature of plant life. Although floristically rich, these grasslands still await syntaxonomic classification. Species typical of subalpine grasslands (e.g. Sesleria coerulea) and a number of thermophille species of lower locations (e.g. Fumana procumbens) grow here. The wide and flat valley floor of the Nadiža valley enables simultaneous monitoring of several different phytocenoses in different succession stages (e.g. original stands of gray willow, 0.5 m in height, and forest stands where gray willows are up to 10 m high). Forest stands on river terraces can be classified as belonging to the white ash plant community (Carici albae-Carpinetum betuli, • ušin 2002). All the mentioned phytocenoses and their growing sites are included in the list of Habitats of European Importance whose protection requires establishment of special protected areas (Direktiva Sveta 92/43 EGS).

In this paper, I have only presented some biological findings on the natural assets of the Nadiža valley. Literature provides us with ample data on geology and geography of the area (e.g. Slovene geologist Stanko Busar found out that the Nadiža erodes more gravel than it accumulates), but the area remains relatively unresearched from the standpoint of biological sciences, especially zoology.

4 Tourism activities and adventive species

In summer months, the Nadiža is a popular bathing site as it is relatively warm for an alpine river (the water reaches 22 °C). The quantities of litter and other waste matter increase, which is mainly disturbing from the aesthetic point of view. For now, there is just one tourism facility in the Nadiža valley. This is the camping site Nadiža at Podbela, which is open in summer and whose activities have not had any marked effects on the nature to date. More worrying, however, is the uncontrolled expansion of the camp in several locations and the proposed construction of a health centre as the carrying capacity of the area is nearly exceeded.

There are two reasons why tourism activities have a harmful effect on the vegetation of the area. On the one hand, regulation of the river (with an aim to protect tourism facilities) is reducing its natural dynamics and the living space of the species which cannot thrive elsewhere because of fierce competition. The original growing sites along the river are also a refuge for meadow plants which are gradually disappearing from the overgrown hay meadows. On the other hand, crowds of visitors from

rastišča ob rekah so tudi refugij za travniške rastline, ki postopoma izginjajo z zaraščenih senožetih. Po drugi strani pa večji obisk ljudi iz različnih krajev povečuje možnost nenamernega prenosa adventivnih vrst, ki se v spremenjenem okolju (npr. stabilizirani rečni bregovi, okolica gostinskih objektov) še lažje naturalizirajo.

Adventivne rastline zaenkrat ne oblikujejo samostojnih sestojev in so le primešane avtohtoni vegetaciji. Med pogostejšimi vrstami naj omenim topinambur (Helianthus tuberosus), orjaško zlato rozgo (Solidago gigantea) in žlezavo nedotiko (Impatiens glandulifera). V vrbovju na ovinku Nadiže pri Robiču sem opazil tudi nekaj grmov japonskega dresnika (Falopia japonica).

5 Posegi v strugo Nadiže

Ker so se zadnja leta stopnjevali neprimerni posegi v strugi Nadiže, sem na simpoziju Flora in vegetacija Slovenije (26.–27. novembra 1999 v Ljubljani) sprožil pobudo za strožje varovanje tega enkratnega ekosistema. Na peticijo in spremno obrazložitev, ki sem jo poslal pristojnim službam na Ministrstvu za okolje in prostor (MOP), sem v kratkem dobil odgovor, da tedanji (in še zmeraj veljavni) status Nadiže zagotavlja njeno učinkovito varovanje. Vendar se uničevanje tega občutljivega ekosistema še nadaljuje. Omenil bom le nekatere posege, ki vplivajo na naravno dinamiko rečnega ekosistema. Če so že v kampu Nadiža pri Podbeli prenehali vsako poletje izkopavati plavalni bazen (investicija se ni obrestovala, saj ga je prva visoka voda zasula), se drugod vrstijo nedovoljeni posegi. Ne morem si predstavljati, da je tako veliko podjetje, kot je Splošno gradbeno podjetje Primorje Ajdovščina, jeseni leta 1999 gradilo most čez Nadižo brez soglasja naravovarstve službe. Niso vedeli, da je potrebno. Tega očitno ne ve tudi Cestno podjetje Nova Gorica, ki je nekaj mesecev kasneje rekonstruiralo cesto Podbela–Robidišče in pri gradnji podpornih zidov na več krajih poseglo v strugo reke Nadiže. Kot kaže, je najbolj enostavno narediti po svoje, potem pa pridobiti soglasje, če ga kdo sploh zahteva. Pri zgoraj naštetih posegih je dobro to, da po končanem delu prenehajo negativni vplivi in reka sama čez nekaj let vzpostavi naravno stanje. Zgodba zase je kopanje gramoza pri Robiču. Pod pretvezo zaščite ceste Robič–MMP Robič že nekaj let VGP Soča d.d. in njeni podizvajalci kopljejo, sejejo in prodajajo prod na omenjenem odseku reke. Za to dejavnost jih plačuje še država, saj naj bi s posegi zavarovali cesto pred poškodbami od povodenj. V ta namen je VGP Soča izdelalo projekt št. 1/2000 (Nadiža – vzdrževanje pretočnega profila), ki naj bi imel za cilj usmeriti tok Nadiže k Miji. Kot kaže, se s sedanjim načinom dela ta projekt ne bo zlepa uresničil, kar je vsekakor v interesu posameznih podjetnikov in krajevne oblasti. Podizvajalci delajo ravno nasprotno, prod kopljejo pod cesto, da bi tudi v prihodnje dobili opravičilo za svoja početja. Sploh

different places increase the possibility of unintentional transfer of adventive species whose naturalisation is even easier in modified environments (e.g. stabilised river banks, vicinity of catering facilities).

So far, adventive species have not formed independent stands and grow together with native species. The most frequent adventive species to be found in the area are the Jerusalem artichoke (Helianthus tuberosus), smooth goldenrod (Solidago giagantea) and Indian balsam (Impatiens grandulifera). In the willow stands at a turn the Nadiža makes at Robič I have also noticed some bushes of Falopia japonica.

5 Interventions in the Nadiža riverbed

Recently, inappropriate interventions in the Nadiža riverbed have increased both in number and severity, and at the symposium Flora and Vegetation in Slovenia (26 – 27 November 1999, Ljubljana, Slovenia) I therefore launched a proposal for stricter protection of this unique ecosystem. The petition and the accompanying letter of explanation, which I sent to the competent agencies at the Ministry of the Environment, Spatial Planning and Energy (MOP), were dismissed claiming that the status of the Nadiža river ensures its efficient protection. Nevertheless, the destruction of this sensitive ecosystem continues. I shall only point out several interventions which have had a harmful effect on the river ecosystem dynamics. Although a swimming pool in the Camp Nadiža is no longer dug our every summer (the investment was not profitable as the pool was flooded every year at the first high water), unsolicited interventions are still underway in other locations. It is in fact hard to imagine that a big construction company such as Splošno gradbeno podjetje Ajdovščina would build a bridge across the Nadiža in 1999 without previously obtaining a consent from the nature conservation service. They claim they did not know it was necessary. Obviously, Cestno podjetje Nova Gorica does not know anything about it either, as it reconstructed the road Podbela-Robidišče a few months later and in the construction of supporting walls intervened in the Nadiža riverbed in several locations. It seems that it is easiest to do what one wishes to do and, if at all required, obtain the consent later. The positive aspect of the above described interventions is that their harmful effects cease when the work is over and that the river itself restores its natural state in a few years. The gravel site at Robič is another story. Under the pretence of protecting the road Robič-MMP Robič, the company VGP Soča d.d. and its subcontractors have been digging, sieving and selling gravel at the mentioned section of the road for a number of years. They are even being paid by the state as the activity is supposed to protect the road from flood damage. To this aim, the company VGD Soča d.d. prepared the project 1/2000 (Nadiža – Maintenance of Flow Profile), the purpose of which is to direct the course of the Nadiža towards Mija. By the look of things, the project is nowhere near implementation, which seems to suit the interest of individual businessmen and local authorities. Subcontractors have been doing just the opposite, digging gravel under the road, in order to be able to justify their activities also in the future. In any case, it makes little

pa je neumno usmerjati Nadižo proti Miji, ker že sedaj naredi oster ovinek pri Deru, potem pa bi ta kot znašal skoraj 180° (kot meander kakšne nižinske reke). VGP Soča d.d. je znano po neprofesionalnih posegih in kršitvi zakonov. Pred leti so npr. odlagali kamnite bloke vsepovsod na prodiščih Nadiže, pred tremi leti pa so za utrjevanje rečnega brega pri Podbeli dovažali zdrobljene apnenčaste skale iz Molide (zavarovanega arheološkega območja). S posegi so kršili Zakon o ohranjanju narave (ZON) in sicer drugi, tretji in četrti odstavek 14. člena, prvi in drugi odstavek 15. člena ter 104. in 105. člen. Po prvem odstavku 160. člena ZON so naredili številne prekrške (pod zaporednimi številkami 2, 3, 4, 10, 23, 33), po prvem odstavku 161. člena ZON pa prekrška št. 1 in 12. Vsi posegi se lahko obravnavajo kot prekrški tudi po 333. členu Zakona o kazenskem postopku (Uradni list 63/1994 – kazniva dejanja zoper okolje, prostor in naravne dobrine). Kaže pa, da za takšna početja ne bodo nikoli kaznovani (na moj zahtevek o prepovedi njihovega delovanja nisem še dobil odgovora). Vprašljivo je, kdaj bo Zakon o ohranjanju narave sploh operativen.

6 Državne inštitucije in mediji

K takšnemu stanju na območju naravnega spomenika prispevajo s svojimi početji tudi službe, ki imajo v pristojnosti varovanje okolja. Prvič me je neprijetno presenetil podatek o varstvenem statusu Nadiže v turističnem vodniku Naravne znamenitosti Slovenije (Habjan & Skoberne 2000), kjer na str. 63 piše, da je reka Nadiža šele v predlogu za zavarovanje. Drugič me je presenetilo (zdaj že nekoliko manj), da gospa Mateja Kocjan (sicer oseba, odgovorna za stike z javnostjo na MOPu), na vprašanje medijev o dogajanjih na Nadiži odgovarja: »Predlagamo, da g. Čušin strokovno sodeluje pri pripravi programov za vzdrževanje, če želi zaščititi prej omenjeno reko …« (12. 7. 2002 desk@mladina.si). Sklepam, da tudi omenjena gospa ne ve, da Nadiža že ima pravni status naravovarstvenega objekta. V tem okviru lažje razumem, zakaj na moje številne dopise o nedovoljenih posegih v Nadižo, ki sem jih naslovil na Inšpektorat za okolje in prostor, nisem dobil pisnega odgovora. Prvič se je to zgodilo letos poleti in sicer šele potem, ko je o teh posegih začel poizvedovati Boštjan Pihler, univ. dipl. inž. gozdarstva, človek, ki bi bil lahko za zgled vsem biologom in naravoslovcem, saj si zelo prizadeva poučiti in ozavestiti širok krog ljudi o tem, kako delujejo ekosistemi. Poudariti moram, da se biologi premalo angažiramo pri neustreznih posegih v naravo in imamo zato majhen vpliv na njihovo končno podobo. Prof T. Wraber je eden od redkih biologov, ki se ob takih dogodkih oglasi v medijih (dnevnik Delo, 21. 12. 1996 in 6. 6. 1997). Žalostno je tudi to, da druge organizacije in ustanove, ki bi lahko prispevale k boljšem varovanju narave, to počnejo le v okviru svojih interesov, npr. Zavod za ribištvo intervenira le, če je uničen ribji fond, krajevni gozdar pa se ne zmeni za

sense to direct the course of the Nadiža towards Mija. The river makes a sharp turn at Der and after the intervention the angle of the turn would be almost 180º, resembling a meander of a lowland river. VGP Soča d.d. is widely known for its unprofessional interventions and violations of law. Several years ago, the company deposited stone blocks all over the Nadiža sand and gravel flats, while three years ago, crushed limestone rocks from Molina (protected archaeological site) were transported to the Nadiža to stabilise its bank at Podbela. Those interventions violated the provisions of Article 14, paragraph 1, 2, 3 and 4, Article 15, paragraph 1 and 2 and Articles 104 and 105 of the Nature Conservation Act. Pursuant to Article 160 of the Nature Conservation Act, several offences were committed (items 2, 3, 4, 10, 23, 33), and pursuant to Article 161, paragraph 1, items 1 and 12 were violated. All those interventions may also be considered criminal offences subject to Article 333 of the Criminal Procedure Act (Official Gazette of RS – criminal acts against the environment, space and natural resources). Judging from the fact that I have not received any answer to my request for the termination of these activities I can only assume that the perpetrators will never be punished for their actions. The question remains whether the Nature Conservation Act will ever become operational.

6 State institutions and the media

In part, the current state of the natural monument has resulted from the actions and attitutes of competent authorities. Personally, I was rather unpleasantly surprised by the information on the protection status of the Nadiža river in the tourist guide Valuable Natural Features of Slovenia (Naravne znamenitosti Slovenije - Habjan & Skoberne 2000), which states on page 63 that the Nadiža is an area proposed for protection. I was similarly astonished (the element of shock had worn out by then) when Ms Mateja Kocjan (Public Relations Officer at the Ministry of the Environment, Spatial Planning and Energy) stated the following in response to the media inquiry about the interventions into the Nadiža river: »We propose that Mr Čušin participates in the preparation of maintenance programmes if his aim is to protect the before mentioned river …« (12. 7. 2002 desk@mladina.si). I can only assume that Ms Kocjan does not know that the Nadiža already has the legal status of a nature conservation site. However, in the light of what has been said, I find it easier to understand why my correspondence on unsolicited interventions in the Nadiža, which was addressed to the Inspectorate for the Environment and Spatial Planning, remained unanswered. I received the first reply to my letters in the summer of 2003, only after some inquiries had been made by Mr Boštjan Pihler (BSc Forestry), who can serve as an example to all biologists and nature conservationists because of his constant efforts for awareness-building and his attempts to inform the general public of how ecosystems actually work. I would like to stress that biologists are not sufficiently involved and active when it comes to inappropriate interventions in the nature and therefore have a small influence on their final outcome. Professor Tone Wraber is one of the few biologists who regularly writes in the

početja v obrečnih logih, čeprav imajo v gozdarskih načrtih status varovalnih gozdov.

Če je pred desetletjem širša javnost podpirala varstvo okolja in je ljudi skrbelo, kaj se počne z naravo, ima zdaj bolj indiferenten odnos. Podobno je s krajani, ki so pripravljeni ukrepati le, če v tem vidijo kakšno korist. V letih 1993 in 1994 sta se krajevna in širša skupnost uprli izgradnji jeza na Nadiži, kar bi za zmeraj uničilo rečno dolino med Kredom in Podbelo. Ne morem se sprijazniti z dejstvom, da je pobuda in ideja prišla od naravoslovca, inženirja gozdarstva dr. Viktorja Klanjščka. O njegovem odnosu do narave sklepamo iz njegovega pisma (30. 12. 1994): »Neumestno je trditi, da so prodišča, delno pokrita z vrbišči, naravna znamenitost. Korito in vrbišča nimajo stalnosti, velike vode menjavajo korita. Poleg tega prodišča in vrbišča nimajo estetske vrednosti« (Dokumentacija o Nadiži v arhivu Občine Tolmin). V polemiki na pisanje medijev odgovarja: »Zavod (nanaša se na ZVNKD Nova Gorica) navaja pet redkejših botaničnih vrst, ki naj bi bile endemične. Jeseni so jih iskali in jih niso našli« (primerjaj poglavje Naravna bogastva), in nadaljuje: »niso vzdržne trditve, da so 4 travce bolj važne kot pa dobrobit naših ljudi«. Kot argumente za ojezeritev Nadiže je navajal tudi to, kako dobro živijo ljudje na Bledu in kako lepa je panorama Blejskega jezera. V odgovoru na pismo Vanetu Gošniku piše (24. 12. 1994): »Ni bojazni, da bi bila prodišča, vrbje in opuščene karoserije kakšna atrakcija za pridobitev turistov.« Pa se je vendar zgodilo prav to. Nadiža je postala množično kopališče s kampiranjem, pikniki in sindikalnim turizmom v najslabšem pomenu besede. Podobno neprimerno razmišlja o rastlinah ob Nadiži tudi Katja Roš (dnevnik Delo, 28. 5. 1997), vendar smo od novinarjev vajeni, da ne napišejo vse prav.

7 Sklepne misli

Varovanje Nadiže je za državo pomembno, ne samo zaradi njene enkratnosti, ampak tudi zato, ker so podobni ekosistemi v Sloveniji zelo degradirani ali povsem uničeni (Soča med Bovcem in Žago ter med Kobaridom in Tolminom, glej npr. Jogan & • ušin 2002, Sava Dolinka med Mojstrano in Kranjsko Goro). Z neprimernimi vodnogospodarskimi ukrepi se ponavadi ne dosežejo želeni učinki, redke vrste pa so izpostavljene fizičnemu iztrebljenju.

newspapers on these interventions (Delo, 21. 12. 1996 and 6. 6. 1997). It is also sad that other organisations and institutions which could contribute to better nature protection, do so only to satisfy their own interests. The Fisheries Research Institute of Slovenia, for example, intervenes only if the fish fund is destroyed, and local foresters manage to ignore various activities underway in alluvial forests although these are included in Forestry Management Plans as protective forests.

Only a decade ago, the general public used to support nature conservation and people were concerned with what was going on with nature. Today, the attitude of the public is much more indifferent. Similarly, local inhabitants are only willing to act provided there is some benefit for them. In 1993 and 1994 the local community and the general public fought the construction of a dam on the Nadiža, which would terminally destroy the river valley between Kredo and Podbela. It is hard to understand that the initiative for the dam was launched by a nature conservationist, dr. Viktor Klanjšček, who is also a Forestry Engineer. His attitude to nature is evident from his letter (30. 12. 1994): “It would be inappropriate to say that the gravel flats, partly covered in willow trees, are a valuable natural feature. The riverbed and the willow stands have no stability, large water bodies change their beds. Besides, gravel flats and willow stands have no aesthetic value” (Documentation on the Nadiža river in the archive of Municipality Tolmin). In his response to the media coverage of the issue he says: “The Institute (Institute for the Protection of Natural and Cultural Heritage, Nova Gorica Office) states five rare plant species which are supposed to be endemic. In autumn, the researchers looked for them and failed to find them” (cf. Natural assets). He continues: »The statement that four grasses bear more importance than the well-being of our people does not hold water«. One of his arguments in favour of the dam on the Nadiža was also a reference to how well the people at Bled lived and how beautiful the panorama of Lake Bled was. In his reply to the letter by Vane Gošnik (24. 12. 1994), dr. Klajnšček writes: “There is no fear that gravel flats, willow stands and abandoned car chassis could present an attraction for tourists.” Any yet this is what has happened. The Nadiža river has become a mass bathing area with a camping site, picnic areas and mass tourism in the worst sense of the word. Similarly inappropriate is the coverage of the plants by the Nadiža river, which was written by Katja Roš (Delo, 28. 5. 1997), but we have learnt that what journalists write is not necessarily correct.

7 Conslusions

Protection of the Nadiža is important for Slovenia, not just because of its unique character but also because similar ecosystems in Slovenia are severely degraded or even completely destroyed (the Soča between Bovec and Žaga and between Kobarid and Tolmin, see Jogan & • ušin 2002, the Sava Dolinka between Mojstrana and Kranjska Gora). Although inappropriate water management measures rarely lead to desired effects, rare plants species are still exposed to physical extermination.

8 Viri

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Peter SKOBERNE

IZHODIŠČA VARSTVA MOKRIŠČ V SLOVENIJI IN EVROPSKI UNIJI

Outline of wetlands conservation in Slovenia and European union

Narava ne pozna političnih meja, zato so za uspešno ohranjanje v mnogih primerih potrebni mednarodna pravna določila. Za mokrišča so najpomembnejša: Konvencija o biološki raznovrstnosti, Konvencija o ohranjanju mednarodno pomembnih mokriščih (Ramsarska konvencija) in zakonodaja Evropske unije (ekološko omrežje NATURA 2000).
Praktična izvedba varstva sloni na državni zakonodaji, predpogoj za ukrepanje pa je v prvi vrsti opredelitev mokrišč, vrednotenje njihovega pomena in poznavanje ekoloških zahtev. Vse te podatke potrebujemo ne le za nabor ukrepov, ampak tudi za širjenje zavesti o pomenu in potrebnosti mokrišč v širši javnosti, zlasti pa med tistimi, ki so z mokrišči neposredno povezani (lastniki, nosilci rabe prostora).

Nature does not recognize political borders, so international legal provisions are in many cases essential for successful conservation. Among them most relevant for wetlands are: Convention on Biological Diversity, Ramsar Convention on Internationaly Important Wetlands and legal system of the European Union (ecological network NATURA 2000).
Practical implementation of treaties relies on national legislation, prerequisite for it is identification of wetlands, their evaluation and knowledge of ecological requirements. All these data are needed not only for definition of conservation measures, but for public awareness, as well. People, directely connected with wetlands are the main target group (land owners, other involved stakeholders).

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Uvod

Politične meje držav imajo v naravi povsem nepomembno vlogo, kljub temu pa posledice na naravo niso vedno nezanemarljive. Razrešimo ta navidezen paradoks: meje držav lahko potekajo po neki naravni meji (npr. gorski greben, reka) ali po namišljeni geografski liniji (npr. del poldnevnika). Razen v izjemnih primerih, kot je bila npr. železna zavesa med vzhodno in zahodno Evropo po drugi svetovni vojni, meje ne predstavljajo ločnice za večino rastlinskih in živalskih vrst, celo kadar potekajo po meji ekosistemov. Posledice meja se na drugačen način kažejo na živem svetu. S političnimi mejami je namreč omejeno pravno delovanje države, njena ozemeljska suverenost.

Posledice odločitev in ravnanja v neki državi imajo lahko čezmejne posledice in če želimo ohraniti določene rastlinske in živalske vrste, so potrebni tudi mednarodni dogovori in ukrepi.

Preden si pogledamo, kateri mednarodni predpisi opredeljujejo varstvo barij, pa se ustavimo še pri temeljnem vprašanju: zakaj si prizadevamo ohraniti naravo?

Narava sama ne potrebuje varstva, saj je v geološki zgodovini doslej vedno znala sama izločiti motnjo, zakaj ne bi še sedaj, ko naraščajo problemi zaradi najbolj invazivne vrste - Homo sapiens! Ohranjanje narave v prvi vrsti potrebujemo mi, ljudje. Nismo namreč izločeni iz ekoloških sistemov, smo njihov del, zato je naše preživetje odvisno od uravnoteženega delovanja ekosistemov. K temu lahko naštejemo še druge razloge, od katerih je najbolj tehten etični (priznavanje pravice do življenja drugim bitjem), vsi drugi pa le osvetljujejo problematiko iz različnih zornih kotov (npr. estetski, uporabniški vidik…).

Pomen odločanja

Pri varstvu narave se večinoma ukvarjamo s simptomi, ki se kažejo zaradi netrajnostnega načina življenja, torej skušamo reševati ali vsaj omiliti posledice, ne uspemo pa odpravljati vzrokov.

Kje so torej vzroki problemov varstva narave? Položeni so v odločitvah posameznikov in prek njih skupnosti, držav…, oz. okoliščinah, ki vplivajo na odločitve. Zato si pobliže oglejmo, kako se odločamo.

Najpogostnejši motiv za neko odločitev je, da z njo pridobimo neko korist, ki se lahko izraža v denarju ali drugi materialni dobrini, času, udobju ipd. Ker pomeni odločitev vedno posledico izbire, je zanimiva tudi druga plat - kaj pomeni, če se odločim drugače. Kaj je osnova za pomisleke proti odločitvi za moj osnovni

Introduction

Political state borders are completely irrelevant in nature, but their impact on nature can not always be neglected. What is the solution to this supposed paradox? State borders may run along natural boundaries (e.g. mountain ridges, rivers) or follow an imaginary geographic line (e.g. part of a meridian). With the exception of some cases, such as the Iron Curtain between the eastern and western Europe after World War II, borders are not a dividing line for the majority of animal and plant species even when they run along the boundaries of ecosystems. The impact of political borders on the living nature takes a different shape. Political borders are used to limit the legal operation of a state and its territorial sovereignty.

The consequences of decisions and actions taken in a country may reach beyond the state borders and therefore the only way to guarantee preservation of certain plant and animal species is by means of international treaties and measures.

Before taking a look at the regulations governing the protection of mires, we shall stop for a second at a burning issue: why are we trying to preserve nature?

The nature itself does not need to be protected. In the geological past it had always been able to eliminate the disturbance, so why not now when the problems are piling up, most of them caused by the most invasive species of all – Homo sapiens! Nature conservation is primarily for us, people. We are not excluded from ecological systems, we are a part of them, and our survival is therefore heavily dependent on the balanced operation of ecosystems. The question of ethics, the question of whether we acknowledge other creatures the right to live, is the most important of these other reasons, most of which merely throw more light on the problem by explaining specific views and aspects (aesthetic standpoint, users' standpoint, …)

Importance of decision-making

In nature conservation, the focus is usually on the symptoms arising from unsustainable way of living; we are trying to solve or at least minimise the consequences, but we rarely succeed in eliminating the causes.

And what are the causes of nature conservation issues? They lie in the decisions of individuals, communities, states, and in the circumstances that affect these decisions. Let us therefore have a closer look at the process of decision-making.

Most frequently, a decision is motivated by the benefit we hope to gain from it and which may take the form of money or any other asset such as time, comfort etc. Since a decision is always a consequence of choice, the other side of the coin is interesting as well: what happens if I decide otherwise? And what makes us question the

motiv - korist. Navadno najprej preverimo, če so posledice odločitve zakonite, morda se ustavimo tudi pri etičnem učinku (ali prizadenem drugega). Etična plat odločitve zavisi od naravnanosti posameznika, od njegove občutljivosti za druge, od spoznanja vrednot. Odnos do soljudi je bliže v naši zavesti (pa tudi ne vedno!) kot pa odnos do narave, do drugih živih bitij. Zato argumenti za ohranjanje narave niso velikokrat prepoznani kot tehtni razlogi, ki bi prevesili odločitev na stran narave. Mnogokrat lahko slišimo: "A sedaj pa zaradi ene rastline ne moremo zaslužiti?" Kako naj se rastlinska vrsta pri odločitvah meri z zaslužkom, če tistemu, ki se odloča ne pomeni prav nič?

Zato je pomembna naloga varstva narave v ozaveščanju pomena narave, vseh živih bitij in medsebojne povezanosti, da začutimo pomen narave, od katere smo življenjsko odvisni. Šele takšno prepričanje se lahko odraža v odločitvah.

Pozabili smo namreč jezik narave (ekologije), ki so se ga na zelo trd način naučili naši predniki in zmogli preživeti z minimalnim vložkom energije in z obilo modrosti trajnostnega načina življenja. Zamenjali smo ga za udobje in o njem le še govorimo. Jezik ekologije so v naših družbah zamenjali trije jeziki: ekonomije, načrtovanja in prava. Zato je druga naloga varstva narave prevajati jezik narave v te tri jezike. To pomeni, da ne rečemo preprosto, rastlina ima pravico do življenja, cenim njeno vlogo v naravi, četudi je ne poznam in ne razumem, ampak opredelimo rastlino kot zavarovano (jezik prava), povemo, kjer raste in kaj se tam sme in ne sme (jezik načrtovanja) in koliko to stane, oz. bi stalo njeno uničenje (jezik ekonomije).

Poglejmo si, kako je v jeziku prava opredeljeno varstvo mokrišč.

Mednarodne pogodbe (konvencije)

Prva mednarodna pogodba na svetovni ravni, ki obravnava varovanje mokrišč, seveda vključno z barji, je Konvencija o močvirjih, ki imajo mednarodni pomen, zlasti kot prebivališča močvirskih ptic (The Convention on Wetlands of International Importance, especially as waterfowl habitat). Na kratko jo imenujemo kar Ramsarska konvencija, po iranskem kraju Ramsar, kjer je bila leta 1961 sprejeta. Konvencija nalaga državam pogodbenic obvezo ohranjanja mokrišč, spodbujanje smotrne rabe in vpisa vsaj enega mednarodno pomembnega mokrišča na seznam konvencije. Iz Slovenije sta vpisani dve območji: Sečoveljske soline (1993) in Škocjanske jame (1999).

Ohanjanje barij posredno obravnava tudi leta 1992 sprejeta Konvencija o biološki raznovrstnosti (Convention on Biological Diversity). Njena izhodišča so namreč zelo široka, saj vsebinsko zajema vsa živa bitja od osebkov, vrst do ekosistemov, poleg tega pa razširja tudi odgovornost do ohranjanja življenja do

decisions taken in pursuit of benefit, our fundamental goal? Generally, we check first whether the consequences of a decision are legal and we may stop to consider the ethical effect of a decision (does it hurt others). The ethical side of a decision depends on the orientation of an individual, on his/her empathy with othersand on his/her attitude to values. In our minds, the relationship to other people is closer (not always, though!) than our relationship to the nature and to other living creatures. Consequently, the arguments supporting nature conservation are often not considered relevant enough to push the scales to the side of nature. People often complain: "And now I can't make any money just because of one plant?" When it comes to decisions, how can a plant species measure up with profit if it does not mean anything to the decision-maker?

To prevent such situations, an important task of nature conservation is awareness-building. Nature conservation aims to educate people in the value of nature, in the value of all living beings and interrelations that help us feel the importance of nature upon which our lives depend. Such attitude is a precondition for correct decisions (Fig. 1).

Unfortunately, we have forgotten the language of nature (ecology), which our ancestors fought hard to learn and, after having obtained the knowledge, managed to survive on minimal input of energy and ample wisdom originating in the sustainable way of life. We have traded this language for comfort, and now all we do is talk about it. The language of ecology has been replaced in our societies by three other languages: the language of economy, the language of planning and the language of law. Another task of nature conservation is thus to translate the language of nature into these three languages. This means that we do not simply say that "a plant has a right to live, I appreciate its role in the nature although I do no know it and understand it", we designate a plant instead as a protected species (the language of law), we tell people where it grows and what people are allowed and not allowed to do there (the language of planning), and how much this costs or how much the destruction of this plant would cost (the language of economy).

Now we shall take a look at how protection of wetlands is defined in the langauge of law.

International agreements (conventions)

The first international worldwide agreement which deals with wetland protection is The Convention on Wetlands of International Importance, especially as waterfowl habitat. The convention is known as the Ramsar Convention after the city in Iran where it was signed in 1971. This international treaty obliges signatory states to conserve wetlands through ecologically sustainable use and to nominate at least one wetland site of international importance for inclusion in the convention list. Two areas in Slovenia have been listed under the Ramsar Convention so far: Sečovlje Saltpans (Sečoveljske soline - 1993) and Škocjan Caves (Škocjanske jame - 1999).

The conservation of mires is indirectly covered also by the Convention on Biological Diversity of 1992. Its starting

vseh institucij na državni in krajevni ravni, kakor tudi posameznikov.

Na evropski ravni ureja to področje Konvencija o varstvu prosto živečega evropskega rastlinstva in živalstva ter njunih naravnih življenjskih prostorov (The Convention on the Conservation of European Wildlife and Natural Habitats - 1979), znana kot Bernska konvencija. Opredeljuje ohranjanje rastlinskih in živalskih vrst, zlasti tistih, navedenih v prilogah, vključno z življenjskim prostorom. Posebna resolucija konvencije opredeljuje tudi ekološko omrežje Emerald, ki je komplementarno omrežju NATURA 2000, torej zlasti za države, ki niso članice Evropske unije (Skoberne, 2001).

Vsi ti predpisi obvezujejo Slovenijo k izvajanju obveznosti, vendar so v pogodbah navedeni le okvirni cilji, ki jih vsaka država izpolnjuje s svojo zakonodajo.

Predpisi Evropske skupnosti

K mednarodnim predpisom štejemo tudi zakonodajo Evropske skupnosti, ki obvezuje vse države članice, glede na proces širitve Evropske unije pa tudi pridružene članice, vključno Slovenijo.

Področje varstva narave urejujeta predvsem dve direktivi, in sicer: Direktiva Sveta o ohranjanju prostoživečih ptic (79/409/EGS) - Direktiva o pticah ter Direktiva Sveta o ohranjanju naravnih habitatov ter prostoživečih rastlinskih in živalskih vrst (92/43/EGS) - Direktiva o habitatih ali FFH - direktiva.

Prva direktiva ureja ohranjanje vseh vrst ptičev, za tiste, navedene v Prilogi I pa mora država določiti posebna območja (SPA), na katerih zagotavlja življenjske razmere za te vrste. Podobne cilje navaja Direktiva o habitatih še za preostale živalske skupine, rastline in habitatne tipe. Določa tudi vzpostavitev skladnega ekološkega omrežja za ohranjanje evropsko pomembnih rastlinskih in živalskih vrst ter habitatnih tipov v Evropski uniji. Omrežje je znano pod imenom NATURA 2000, vključuje območja iz Direktive o pticah ter območja, ki ustrezajo merilom po Direktivi o habitatih, zagotoviti pa je treba tudi povezave med območji.

Vsaka država članica Evropske unije mora obveznosti iz direktiv prenesti (transponirati) v notranjo zakonodajo. Ali je pri tem res v popolnosti uspela in kako izpolnjuje te obveznosti, pa razsoja Evropsko sodišče v Luksemburgu.

Obe direktivi sta izjemno pomembni za ohranjanje mokrišč in seveda barij. Vsi tipi barij so navedeni na prilogi I Direktive o habitatih (tab. 1), visoka barja celo kot prednostna, iz česar sledi, da mora vsaka država članica v omrežje NATURA 2000 vključiti zadosten delež barij.

points are very wide since it covers all living creatures from individual specimens and species to ecosystems, and extends the responsibility to preserve life on all state and local level organisations and individuals.

On the European level, this area is regulated by The Convention on the Conservation of European Wildlife and Natural Habitats – 1979, also known as the Bern Convention. It defines conservation of plant and animal species, especially the species and the habitat of the species listed in the Annexes to the Convention. A special resolution to the Bern Convention provides legal basis for the establishment of the ecological network Emerald, which is complementary to the NATURA 2000 network and is primarily intended for non- EU states (Skoberne, 2001).

All these rules and regulations oblige Slovenia to perform its obligations, although the treaties only state framework objectives that each state can implement though national legislation.

European Community regulations

International legal provisions also comprise the Community law which is binding upon all member states and, with a view to EU enlargement, also upon its associate members, including Slovenia.

Nature conservation is regulated by two directives, namely: Council Directive 79/409/EEC on the conservation of wild birds ("Birds Directive") and Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora ("Habitats Directive" or the FFH Directive).

The Birds Directive regulates conservation of all bird species, whereas for the species listed in Annex I a state is obliged to designate Special Protection Areas (SPAs) where appropriate living conditions for these species are ensured. The Habitats Directive states similar objectives for other animal groups, plants and habitat types. It also provides for the establishment in the European Union of a consistent network of plant and animal species and habitat types of European importance. The network known as NATURA 2000 includes areas from the Birds Directive and areas meeting the criteria of the Habitats Directive, and ensures links between the areas.

Each EU member state must pass implementing legislation to transpose the obligations arising from the directives into national law. Whether a state has fully succeeded in doing so and how it manages to fulfill its obligations is decided by the European Court in Luxembourg.

Both directives are extremely important for the conservation of wetlands and mires. All bog, mire and fen types are listed in Annex I of the Habitats Directive (fig. 1), raised bogs are even listed as priority areas, which means that each member state in the network shall include a sufficient percentage of bogs into the network.

Strokovna opredelitev

Prva stopnja pri naravovarstvenem delu je strokovna opredelitev. Po merilih stroke je treba utemeljiti in predlagati območja, ki jih je želimo ohranjati. Glede na ekološke zahteve pripravimo tudi cilje ohranjanja in predloge varstvenih ukrepov. Temu sledi določitev pravnega statusa, kajti le za tisto, kar je pravni subjekt, lahko uveljavljamo določila iz pravnih predpisov. Torej tisto, kar v predpisih ni opredeljeno, v pravnem sistemu ne obstaja.

Pri strokovni opredelitvi je treba določiti najprej tipološko pripadnost. Pri habitatnih tipih se opiramo na tipologijo habitatnih tipov Slovenije (Agencija RS za okolje, 2003). Pomembno je tudi, da je vsako območje prostorsko (meje določene vsaj na zemljevidu 1: 25.000, zaželeno na 1:5.000) in vsebinsko (opis, rastlinske združbe, ključne vrste) opredeljeno. Lokacije lahko povzamemo iz literature, s terenskim delom, metodami daljinskega zaznavanja ali posredno prek nahajališč značilnih vrst (oz. kombinacije značilnih vrst).

Sledi vrednotenje. Vsako evidentirano območje primerjamo znotraj tipološke skupine zlasti glede na:

- ohranjenost strukture in funkcije
- regionalne posebnosti
- delež površine v državi/regiji in pomen za ohranjanje znotraj celotnega areala
- mednarodne obveznosti glede vrst in habitatnih tipov, navedenih v sprejetih mednarodnih pogodbah

Pomembna faza je opredelitev varstvenih ciljev in ukrepov. Splošni cilj je seveda ohranitev, kar pa ni vedno preprosto doseči, zlasti kadar je habitatni tip, ki ga želimo ohraniti, rezultat človekove rabe. Cilji morajo biti jasni in razumljivi, saj morajo osmisliti ukrepe, ki jim sledijo, vsem deležnikom, predvsem pa lastnikom območja.

Določitev pravnega statusa

Strokovni opredelitvi sledi določitev pravnega statusa. Po Zakonu o ohranjanju narave (Ur. l. RS, 22/03 – prečiščeno besedilo) so za območja, pomembna za ohranjanje narave, na voljo tri možnosti:

- naravne vrednote so posebej izstopajoči naravni pojavi in oblike (npr. jame, izviri, reke, skalni samotarji, jezera, slapovi…) - na podlagi vladnega predpisa jih določi in razvrsti minister;
- ekološko pomembna območja so tista, ki so ključna za ohranjanje ekosistemov, vključno z rastlinskimi in živalskimi vrstami; določi jih Vlada;
- posebna varstvena območja so tista, ki ustrezajo merilom in obveznostim po sprejetih mednarodnih obveznostih (torej tudi Ramsarske, Bernske konvencije in evropske zakonodaje); prav tako jih določi Vlada.

Expert definition

Expert definition is the first stage in nature conservation work. Areas for conservation need to be assessed according to nature conservation standards and proposed for designation. With a view to ecological requirements, conservation objectives and proposed protective measures are prepared. Then the area is assigned a legal status, for we can only pursue and implement legal provisions for legal entities. If something is not contained in legal provisions, it does not exist in the legal system.

In preparing expert definition, we first need to determine the typology of a natural feature. As for habitat types, this definition is based on the typology of the habitat types of Slovenia (Agency of the RS for the Environment). It is also important that each area is defined spatially (boundaries in a topographic map on a scale of 1:25000 or, preferably, 1:5000) and in terms of content (description, plant communities, key species). The information on locations can be obtained from available literature, field work and remote sensing or indirectly through characteristic species occurrence (combination of typical species).

The next stage of nature conservation work is evaluation. Each recorded area is compared with others within its typological group, especially as regards:

- degree of conservation of the structure and functions
- regional specificities
- proportion of the surface area within a state/region and its role in preservation within the entire areal
- international obligations regarding species and habitat types listed in valid international agreements

Another important stage is the definition of protection objectives and measures. It goes without saying that the general objective is nature conservation, but this aim is not always easy to achieve, especially if a habitat type to be preserved is a result of human use. The objectives must be clear and understandable for they should make any subsequent protection measures meaningful to all stakeholders, and land owners in particular.

Definition of the legal status

Expert definition is followed by the defintion of the legal status. According to the Nature Conservation Act (Official Gazette of the RS, 22/03 – consolidated text), there are three options available to areas important for nature conservation:

- valuable natural features are natural phenomena and forms of outstanding value (e.g. caves, springs, rivers, solitary rocks, lakes, waterfalls, …); they are defined and classified by the Minister on the basis of a Government act;
- ecologically important areas are the areas which are of key importance to ecosystem conservation, including plant and animal species; they are established by the Government;
- special protection areas are areas which meet the requirements and obligations arising from valid international treaties (including the Ramsar

Ukrepi varstva naravnih vrednot

Treba je razlikovati določitev pravnega statusa od ukrepov. Z drugimi besedami, le za tista območja, ki imajo s predpisom določen pravni status, lahko uporabljamo ukrepe iz Zakona o ohranjanju narave. Včasih je bil na voljo le en ukrep in sicer zavarovanje območja (npr. kot narodni park, naravni spomenik ali rezervat), zato še sedaj mnogi enačijo zavarovanje z določitvijo statusa. Vendar je Zakon o ohranjanju narave kar dobro napolnil naravovarstveno orodjarno. Na voljo so namreč naslednji ukrepi:

- pogodbeno varstvo
- skrbništvo
- zavarovanje (zavarovana območja)
- širša zavarovana območja: narodni, regijski in krajinski park
- ožja zavarovana območja: strogi naravni rezervat, naravni rezervat, naravni spomenik
- začasno zavarovanje
- obnovitev
- zakonita predkupna pravica
- omejitev v pravnem prometu
- razlastitev in omejitev lastninske pravice
- odškodnina

Vseh ukrepov še ne moremo uresničevati, ker nekateri zahtevajo še podzakonske predpise, s katerimi se podrobneje predpišejo načini izvajanja, za nekatere pa ni zagotovljenih dovolj finančnih sredstev.

Predlogi za varstvo mokrišč v Sloveniji

Med mokrišči so barja tisti habitatni tipi, katerim je že od začetkov varstvene dejavnosti veljala posebna pozornost. Tako je na primer slabih sto let po izkopu Gruberjevega kanala tarnal Carl Deschmann (1858: 59) nad usodnimi spremembami na Ljubljanskem barju: »Neskončna trstičevja, katera so nekoč obiskovali z veliko previdnostjo le lovci, so spremenjena v obsežna koruzna polja...«

V prvem programskem dokumentu, Spomenici Odseka za varstvo prirode pri Muzejskem društvu, je za zavarovanje predlagan ostanek Ljubljanskega barja pod Grmezom, kajti »povsod drugod sta izsuševanje in kultura povsem izpodrinila barski značaj« (Spomenica,1920:71), drugih mokrišč pa ta dokument ne omenja.

V pregledu naravnih znamenitosti, ki ga je pripravil Anton Šivic (1944) so navedena naslednja mokrišča: izviri pri Ljubljanici, soteska Pekel pri Borovnici, barjanske lokalitete (Koslerjeva gošča, pokljuška, jelovška in pohorska barja). Na ogroženost mokrišč je opozorilo več avtorjev, med njimi tudi Tone Wraber (1972) v Zeleni knjigi, enem prvih pregledov ogroženosti slovenske narave.

Šele v Inventarju najpomembnejše naravne dediščine Slovenije leta 1976 so mokrišča obravnavana bolj enakovredno ostalim zvrstem dediščine, vendar

Protection measures for valuable natural features

We need to distinguish between the legal status and the measures applied. In other words, the measures stated in the Nature Conservation Act can only be applied to the areas whose legal status is defined in valid legal povisions. In the past, there used to be only one measure, namely protection of an area (as a national park, natural monument or nature reserve), and many people even today equate protection with the definiton of the legal status. However, the Nature Conservation Act has added many new tools to the nature conservation toolbox. The following measures are available:

- contractual protection
- stewardship
- protection (protected areas)
- large protected areas: national, regional and landscape park
- small protected areas: strict nature reserve, nature reserve, natural monument
- temporary protection
- restoration
- right of preemption
- restrictions on legal transactions
- expropriation and property right restrictions
- compensation

Unfortunately, implementtaion of all these instruments is currently not possible as some require further implementing regulations which would prescribe implementation methods in more detail, whereas the others require more financial resources than are currently available.

Proposals for wetland conservation in Slovenia

Of all wetland types, bogs are the habitat that has been considered with special attention since the very beginning of nature conservation activities. About 100 years after the Gruber Canal had been made, Carl Deschmann (1858: 59) complained about severe changes in the Ljubljana Moor (Ljubljansko barje): "Endless reeds which only hunters used to visit, and with great caution, have now been turned into extensive corn fields…«.

In the first programme document, a Memorandum produced by the Department of Nature Protection at the Museum Society of Slovenia, only the part of the Ljubljana Moor below Grmez was proposed for protection because in other parts of the moor "drainage and cultivation have overidden the area's bog character" (Memorandum, 1920: 71). The Memorandum makes no mention of other wetlands.

The list of outstanding natural features drawn up by dr. Anton Šivic in 1944 states the following wetlands: springs by the Ljubljanica river, gorge Pekel near Borovnica, bog sites (the Kosler bog, bogs on the Pokljuka and Jelovica plateaux and the bogs on Pohorje). The endangerment of

predvsem tista, ki izstopajo zaradi botaničnega ali zoološkega pomena. Pregled je bil dopolnjen še v drugi izdaji Inventarja (1988, 1991).

V Sloveniji še vedno nimamo celovitega pregleda mokrišč, zlasti veliko je takšnih z majhno površino. Po naključno zbranih podatkih lahko sklepamo, da se bo ob bolj sistematičnem delu pokazala še množica mikrolokacij. S sistematičnim kartiranjem habitatnih tipov bi šele dobili celovit pregled nad mokrišči v Sloveniji.

Nekatera mokrišča, zlasti najbolj znana, so zavarovana posamično kot npr. Zelenci, barje Jezerc, ali v sklopu večjih zavarovanih območij (npr. pokljuška barja v Triglavskem narodnem parku). Mnogo mokrišč bo imelo določen pravni status naravne znamenitosti z uredbo ministra, dobršen delež pa jih tudi ustreza merilom Direktive o habitatih, tako da bodo vključena v ekološko omrežje Evropske unije NATURA 2000.

Načinov in poti za ohranjanje mokrišč je torej kar dovolj, pomembneje pa je, ali jih sploh želimo ohranjati, ali nam dovolj pomenijo, da jim bomo pri odločitvah dajali prednost pred tistimi posegi in dejavnostmi, ki jih ogrožajo. Zato je tako pomembno, da so varstveni cilji jasno postavljeni, da drugi deležniki, predvsem lastniki že od začetka sodelujejo pri postopkih. Brez razumevanja pomena območij narave za življenje vsakega posameznika ne moremo pričakovati učinkovitega ohranjanja.

wetlands was soon pointed out by many writers, also Tone Wraber (1972) in his Green Book which is one of the first reports on the endangerment of Slovene nature.

Only in the Inventory of Natural Heritage in Slovenia, published in 1976, wetlands were given equal attention as other forms of natural heritage, but wetlands of outstanding botanical or zoological value remained in the focus. The list was upgraded in the Inventory's second edition (1998, 1991).

Slovenia still lacks a comprehensive wetlands survey that would also include a number of small-sized wetland areas. On the basis of accidentally gathered data we can assume that a more systematic approach would reveal a number of microlocations. A compehensive overview of the wetlands in Slovenia, however, can only be provided through a systematic mapping of habitat types.

Certain wetlands areas, especially those which receive most publicity and attention, are protected under individual protection regimes (Zelenci, Jezerca) or fall within a larger protected area (e.g. Pokljuka bogs in Triglav National Park). A number of wetlands will be awarded legal status of an outstanding natural feature by Minister's decree, and some also meet the criteria of the Habitats Directive and will as such be included into the EU network NATURA 2000.

There are plenty methods and ways to protect wetlands. A much more important question we need to answer is whether we wish to protect them, whether wetlands are important enough to deserve priority treatment over the interventions and activities endangering them. In order to achieve this, nature conservation objectives must be clearly defined so that other stakeholders, owners in particular, are involved in the projects from the start. We need to remember that efficient protection and conservation of these areas is only possible if we fully understand the importance of the preservation of natural areas for the life of every human being.

Andrew M COUPAR

SCOTLAND'S BOGS, SOME PROBLEMS, SOME SOLUTIONS

Barja na Škotskem, problemi in rešitve

Around 20% of Scotland is covered by bogs. These are mostly blanket bogs, which develop as a result of the cool, wet climate. There is also a much smaller area of raised bogs, mostly confined to the lowlands and typically now isolated from other semi-natural habitats by intensive agriculture. Both kinds of bog have suffered to varying degrees from exploitation and unsympathetic management. However, their importance for nature conservation, recreation, environmental education, river basin management etc is now increasingly recognised. Much is now being done to safeguard that which remains relatively intact and to improve the condition of damaged areas.

Barja prekrivajo približno 20 % Škotske. Večina med njimi so t. i. nizka barja, ki so se razvila kot rezultat mrzle in vlažne klime. Visokih barij je precej manj, večinoma se pojavljajo v nižinah in so od ostalih polnaravnih habitatov ločena z intenzivnim kmetijstvom. Obe vrsti barij sta utrpeli precejšnjo škodo zaradi izkoriščanja in neprimernega upravljanja. Danes se vedno bolj zavedamo pomena barij pri varstvu narave, rekreaciji, okoljskem izobraževanju, upravljanju porečij itd.. Veliko je bilo storjenega za zaščito relativno dobro ohranjenih barij in za izboljšanje stanja uničenih.

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Introduction

Scotland, the northern part of the United Kingdom, lies off the north-west coast of mainland Europe. It has an area of some 78,762 km^2 and a population of around 5.1 million. This population is very unevenly distributed, with the greatest concentration in the lowland Central Belt. By contrast, the north-west highlands and islands have amongst the lowest population densities in Europe. The country has a maritime climate with relatively mild winters and cool/warm summers. Rainfall is relatively evenly spread throughout the year, but there are strong climatic gradients, with up to 3000 mm per annum in the mountains near the west coast, but as little as 600 mm in parts of the drier east.

Bog types in Scotland

Bogs in Scotland are generally divided into 2 types: raised and blanket. Raised bogs are mostly confined to the lowlands, particularly the north-east and south-west coastal regions and the Central Belt (Figure 1). The original extent of raised bogs is thought to have been around 67,000 ha, but now only some 2,500 ha of raised bog are to be found in a relatively undisturbed state (Lindsay & Immirzi 1996). Blanket bogs, by way

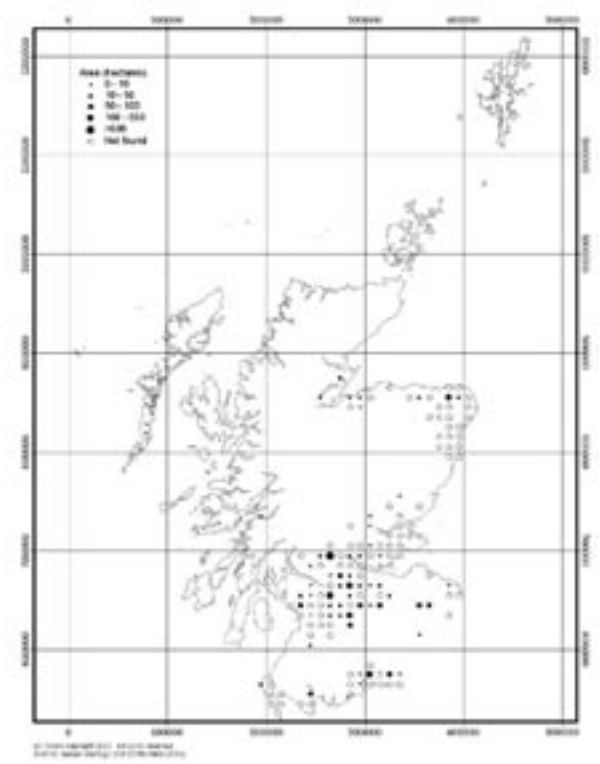

Figure 1. Distribution of raised bogs in Scotland (from Ellis & Munro, in press)

Slika 1: Razporeditev visokih barij na Škotskem (po Ellis & Munro, v tisku).

Uvod

Škotska leži na severu Združenega kraljestva. Njena površina znaša okoli 78.762 km^2 in ima približno 5,1 milijonov prebivalcev. Poseljenost je neenakomerna, največja koncentracija prebivalstva je v Osrednji Beltski nižini, medtem ko so severozahodno nižavje in otoki med najbolj redko naseljenimi predeli v Evropi. Podnebje je oceansko, z relativno milimi zimami in hladno/ toplimi poletji. Padavine so precej enakomerno razporejene preko celega leta. Razlike so le v količini padavin. Za hribovje ob zahodni obali je značilno, da pade do 3000 mm padavin letno, medtem ko je vzhodni del suh, s komaj 600 mm padavin.

Barja na Škotskem

Na Škotskem v splošnem poznamo dva tipa barij: visoka barja in nizka barja. Visoka barja so omejena na nižine predvsem v severovzhodnih in jugozahodnih priobalnih regijah in v Osrednjem Beltu (Slika 1). Njihova površina znaša približno 67.000 ha, samo 2.500 ha visokih barij

Figure 2. Distribution of blanket bogs in Scotland (from Ellis & Munro, in press)

Slika 2: Razporeditev nizkih barij na Škotskem (po Ellis & Munro, v tisku).

pa je v dokaj nespremenjenem stanju (Lindsay & Immirzi 1996). Nizka barja so bolj splošno razširjena in pokrivajo približno 1.900.000 ha površine (Jackson & McLeod 2002). Prevladujejo v severnem in zahodnem delu, na

of contrast are much more widespread and extend to around 1,900,000 ha (Jackson & McLeod 2002). They dominate the landscape in the north and west but in the drier east are mostly confined to the higher hills (Figure 2).

Table 1. Characteristics of raised bogs

- Small (10s, occasionally 100s of ha), discrete
- Initiation and development due to impeded drainage. Maintenance dependent on rainfall > (evapotranspiration + run-off)
- Vegetation fairly uniform irrespective of location
- Truly ombrotrophic
- Peat depth typically 3-6(-10)m
- Peat accumulation rate fairly uniform (~1mm/year)
- Peat initiation date fairly uniform (post-glaciation, ~10,000 years ago)

Tabela 1. Lastnosti visokih barij

- Majhna (10, včasih 100 ha), manj opazna.
- Nastala so na nepropustni podlagi. Odvisna so od padavin > (evapotranspiracija + odtekanje).
- Vegetacija ni odvisna od lokacije barja, ampak je na vseh barjih bolj ali manj enaka.
- Prava ombrotrofna barja.
- Debelina šote je navadno 3-6(-10)m
- Nastajanje šote je enakomerno (~1mm/leto)
- Šota je začela nastajati na vseh barjih v istem času (po ledeni dobi, ~pred 10,000 leti)

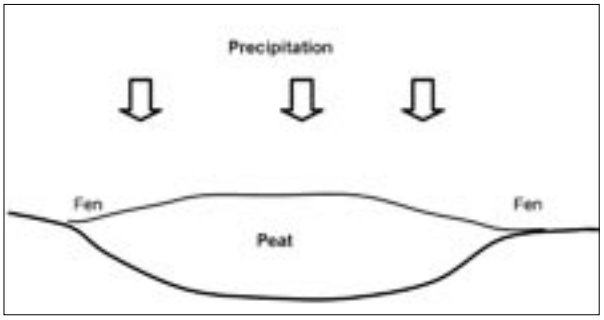

Figure 3. Diagrammatic representation of peat deposit associated with raised bog

Slika 3: Prerez visokega barja.

Although each of these bog types has its own specific characteristics (Tables 1 and 2, Figures 3 and 4), it should be recognised that bogs develop and exist along a continuum of variation. Some bogs cannot be readily ascribed to one type or the other, sharing characteristics of both. These are referred to as 'intermediate bogs'.

sušnejšem vzhodnem delu pa jih najdemo v višjih gorskih predelih (slika 2).

Table 2. Characteristics of blanket bogs

- Extensive (100s → 1000s of ha), landscape scale
- Initiation, development and maintenance dependent on high rainfall/wet days
- Vegetation very variable according to altitude, latitude and longitude
- Not truly ombrotrophic
- Peat depth variable, typically 1-3(-6)m
- Peat accumulation rate very variable
- Peat initiation date very variable

Tabela 2. Značilnosti nizkih barij.

- Velika (stotine do tisoče hektarov), dajejo obliko celotni pokrajini
- Začetek nastajanja barij, njihov razvoj in obstoj so odvisni od količine padavin/vlažnih dni.
- Vegetacija je odvisna od nadmorske višine, zemljepisne dolžine in širine.
- Niso prava ombrotrofna.
- Debelina šotne plasti je različna, navadno 1-3(-6)m
- Hitrost nastajanja šote je različna.
- Začela so nastajati v različnem času.

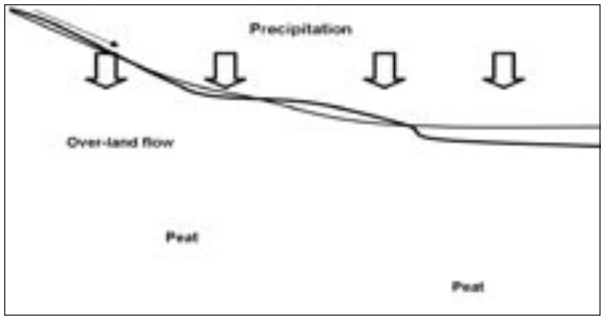

Figure 4. Diagrammatic representation of peat deposit associated with blanket bog

Slika 4. Shematski prerez nizkega barja.

Vsak tip barij ima svoje značilnosti (tabela 1 in tabela 2, slika 3 in slika 4). Barja nastajajo na različne načine in so zato tudi različna. Nekaterih barij ne moremo uvrstiti v ta ali oni tip, ker združujejo lastnosti obeh. Taka barja imenujemo prehodna barja ali angleško 'intermediate bogs'.

Issues affecting bogs

Being a fairly populous country, with at least some of our bogs close to centres of population, it is perhaps inevitable that much of our bog resource has suffered from damaging impacts (Table 3).

Table 3. Current and historical issues having an adverse effect on bogs in Scotland.

Issue	Raised bog	Blanket bog
Peat extraction	✓(horticulture)	✓(fuel)
Forestry	✓	✓
Drainage	✓(grazing)	✓(grazing, sporting)
Grazing	✓(sheep, cattle)	✓(sheep, deer)
Agriculture	✓(crops – historical)	✓(pasture)
Built development	✓(roads, housing)	✓(windfarms)
Burning	✓	✓
Mineral extraction	✓(coal, clay, sand, gravel)	
Neglect	✓	

Peat extraction

Historically, most of the peat extraction from raised bogs was to improve the land for agriculture. Lesser amounts were removed for animal bedding (an alternative to straw) and locally for use as a fuel. Nowadays, most of the peat extracted from raised bogs goes to horticulture. The use of peat in horticulture, particularly by the amateur gardener, has risen steadily in recent years, and despite the increase in the use of alternatives, such as composted municipal waste, demand continues to rise (Anonymous 2000a). Extraction from blanket bog is almost exclusively for use as a fuel, with most being cut for or by crofters (crofting is a form of agricultural tenancy, widespread in the highlands and islands) for domestic use. A land-cover survey based on aerial photography taken in 1988/89 identified some 50,000 ha of blanket bog cut for domestic purposes (MLURI 1993, Coupar et al 1997).

Forestry

Until quite recently, forestry in Scotland typically involved the planting of exotic conifers, principally Picea sitchensis and Pinus contorta, on land of low agricultural value, often bog. To enable the trees to establish and grow, these bogs had to be drained and fertilised. The total area of trees planted on blanket bog, around 153,000 ha, considerably exceeds that on raised bogs (less than 10,000 ha) (Lindsay & Immirzi 1996, Anderson 1997). However, the much smaller total area of raised bog means that a much higher proportion of raised bog has been lost to forestry; some 15% c.f. 8% for blanket bog.

Vplivi na barja

Škotska je gosto naseljena dežela. Nekatera barja segajo do samih območij naselitve. Mnoga barja so poškodovana ali uničena zaradi različnih človekovih aktivnosti (tabela 3).

Tabela 3. Aktivnosti, ki so nekoč in ki še danes negativno vplivajo na barje.

Aktivnost	Visoko barje	nizko barje
Uporabljanje šote	✓(vrtnarstvo)	✓(kurivo)
Gozdarstvo	✓	✓
Izsuševanje	✓ (paša)	✓ (paša, šport)
Paša	✓ (ovce, govedo)	✓(ovce,srnjad, jelenjad)
Kmetijstvo	✓(košnja – nekoč)	✓ (paša)
Urbanizacija	✓(ceste, zgradbe)	✓ (vetrne elektrarne)
Zažiganje	✓	
Izkoriščanje mineralov	✓(premog, ilovica, pesek, prod)	
Ignoranca	✓	

Rezanje šote

Šoto so včasih odstranjevali iz barja zato, da bi izboljšali zemljo za potrebe kmetijstva. Manjše količine so uporabili za steljo, nekaj pa tudi za kurivo. Danes se večina šote uporabi v vrtnarstvu. Uporaba šote v vrtnarstvu, predvsem s strani neprofesionalnih vrtnarjev, se je v zadnjih letih močno povečala kljub povečani prisotnosti drugih alternativnih vrst prsti na tržišču, kot so kompostirani odpadki (Anonymous 2000a). Šota iz nizkih barij je namenjena skoraj izključno za kurivo. Nabirajo jo predvsem "krofterji" za domačo uporabo ("crofting" je oblika kmetijstva, značilna za visokogorja in otoke). S pomočjo posnetkov iz zraka iz let 1988/89 so ugotovili, da je bilo na ta način uničenih okoli 50.000 ha nizkih barij (MLURI 1993, Coupar et al 1997).

Gozdarstvo

Do pred kratkim je bila pomembna panoga škotskaga gozdarstva vzgoja eksotičnih vrst iglavcev, prevladovali sta Picea sitchensis in Pinus contorta. Gojili so jih na področjih z nižjo kmetijsko vrednostjo, pogosto na barjih. Da so drevesa lahko uspevala, so morali tla osušiti in pognojiti. Za vzgojo tujih drevesnih vrst so tako zasadili okoli 153.000 ha nizkih barij in okoli 10.000 ha visokih barjih (Lindsay & Immirzi 1996, Anderson 1997), kar predstavlja 8 % uničenih površin "blanked" barij in kar 15 % uničenih visokih barij.

Drainage

Much of the raised and blanket bog resource has been drained to lower the water table and as a consequence covert the vegetation to drier, heath-like communities. This was done both for agricultural purposes, to improve the grazing for sheep and cattle, and on sporting estates for the benefit of red deer Cervus elaphus and red grouse Lagopus lagopus scoticus. Drainage for agricultural improvement was supported by grants from the UK Government, but this is no longer the case. Many drains are now ineffective, having not been maintained and blocking up naturally. Some, however, particularly those on steep slopes and/or shallow peat, have deepened and widened, thus affecting a wider area. In places this has led to erosion.

Built development

Again, raised bogs have suffered proportionately greater losses than blanket bog to the construction of roads, houses, shops, factories etc. This reflects the concentration of raised bogs in lowland, highly populated areas. Blanket bogs are not immune and currently are experiencing losses to windfarms. Although the turbine bases and associated access tracks take up a relatively small area, they fragment these extensive habitats and disrupt both surface and sub-surface hydrology. The production of hydro-electric power has also resulted in the loss of substantial areas of blanket bog where this has involved the creation of large reservoirs. The bulk of this activity took place in the 1950's and 1960's, but a few new schemes are now being developed as pressure to produce energy from renewable resources increases.

Mineral extraction

Many of Scotland's raised bogs in particular overlie deposits of coal, clay, sand and gravel. In the past the coal was mined with limited impact on the bogs, except when the occasional mine collapsed. Nowadays coal is extracted almost exclusively by open-cast means, thus sharing with sand and gravel quarries the need to remove the peat overburden. Restoration of such sites is typically to some form of wetland habitat, but any bog habitat is normally lost forever.

Agricultural conversion

Farmers and others have historically viewed the low productivity of peatland as a challenge, as something that needs to be improved. Raised bogs in Scotland typically occur amongst some of the most productive agricultural land and the desire to make the bogs equally productive has been a strong one. It is estimated (Lindsay & Immirzi 1996) that crop production and pasture for sheep and cattle is the major land use over some 3,000 ha. This compares with at least 18,000 ha of blanket bog converted to pasture (Coupar et al.1997).

Drenaža

Mnoga barja so drenirali zato, da so znižali nivo vode. S tem se je tudi tipična barjanska vegetacija spremenila. Nadomestila jo je vegetacija, ki je značilna za sušna in topla področja. Barja so izsuševali za potrebe kmetijstva, da so pridobili pašnike za ovce, govedo in površine, ki so bile primerne za jelene Cervus elaphus in gozdne kure Lagopus lagopus scoticus. Izsuševanje za potrebe kmetijstva je z donacijami podpirala tudi vlada Združenega kraljestva, vendar pa dandanes to ne velja več. Mnoge tako pridobljene površine danes ne služijo več svojemu namenu, saj se niso vzdrževale po naravni poti. Nekatere, predvsem tiste na nagnjenih terenih in/ali na tanki plasti šote, so se poglobile in razširile. Na nekaterih mestih je prišlo do erozije.

Urbanizacija

Tudi v tem primeru so večjo škodo utrpela visoka barja, kot nizka barja. To je posledica večje koncentracije visokih barji v ravninskem delu, kjer je tudi poselitev gostejša. Tudi nizka barja niso imuna, trenutno trpijo škodo zaradi izgradnje veternih elektraren. Kljub temu, da sama vetrnica elektrarne zavzame relativno majhen prostor, pa pride do fragmentacije habitatov. Tudi z zajezitvami vode za HE so uničili mnoga nizka barja. Večina teh dejavnosti se je odvijala v 50-ih in 60-ih letih. Danes se vse bolj uveljavlja pridobivanje energije iz obnovljivih virov.

Izkoriščanje mineralov

Številna škotska visoka barja ležijo na nahajališčih premoga, gline, peska in proda. V preteklosti premogovniki niso negativno vplivali na barja, razen, kadar se je sistem podzemnih rovov sesul. Danes pridobivajo premog večinoma iz površinskih kopov, hkrati kopljejo tudi pesek in prod. Pri takem pridobivanju šotne plasti odstranijo. Pri renaturaciji takih habitatov nastane neke vrste močvirje, vendar pa je šota za večno izgubljena.

Kmetijsko spreminjanje

Za kmete in tudi druge ljudi so barja že od nekdaj manj vredne in manj produktivne površine, zato jih je treba izboljšati. Visoka barja na Škotskem se tipično pojavljajo med rodovitnimi površinami, zato je bila že od nekdaj močna želja po tem, da bi tudi barja naredili enako rodovitna. Ocenjujejo (Lindsay & Immirzi 1996), da sta pridelava krme in paša ovac in goveda glavni obliki uporabe kmetijskih površin zadnjih 3.000 let. To sovpada z vsaj 18.000 ha površine nizkih barij, ki so jih spremenili v pašnike (Coupar et al.1997).

Burning

Peatland vegetation is burnt, through a practice known as 'muirburn' to improve its productivity for grazing by sheep, cattle and deer, and also as part of the traditional management for red grouse. Done carefully, burning need not fundamentally alter a bog's species composition.

Muirburn is governed by legislation (Hill Farming Act 1947) and codes of conduct (e.g. Anonymous 2000b). Essentially it aims to remove the unpalatable woody vegetation of dwarf shrubs, principally heather Calluna vulgaris and any dead plant litter, such as the straw-like leaves of purple moor grass Molinia caerulea. It also encourages growth of young, palatable shoots. Fires which are not too hot and which are moving quite quickly do not cause much damage. However, hot, slow moving fires can kill the Sphagnum layer and even set fire to the peat itself. The resultant burnt peat is extremely difficult for plants to recolonise and prone to erosion.

Neglect

Neglect, that is the absence of active management, is really only a problem for bogs that have been damaged in some way, and is much more of a problem for raised than blanket bogs. It is commonly an issue where a raised bog is surrounded by agricultural land. The edges of the bog will typically have been cut away or drained, thus drying the bog to some degree. This is not a major problem where livestock can still get on to the bog and graze it. However, once they are excluded, either by fencing or by a change from stock to crop production, trees, particularly birch Betula spp., take hold and contribute to further drying of the bog and ultimately its replacement by woodland.

Grazing

Grazing, whether by domestic livestock or deer, need not be a problem on bogs. It can, however, have an adverse effect if the stocking density is too high. For example, on blanket bog an acceptable rate is typically 0.5 sheep/ha. At levels above that, too much vegetation is consumed and the species composition starts to change. Also, the bog surface starts to suffer from trampling damage. This too can lead to changes in the species present and, if severe, to erosion.

Other issues

More diffuse impacts, such as atmospheric pollution and climate change undoubtedly also affect the nature and condition of our bogs, but as yet any such changes tend to be masked by the more acute impacts described above.

Zažiganje

Vegetacijo na barju zažigajo zaradi izboljšanja kvalitete paše. Pri pravilni izvedbi zažiganje ne vpliva na vrstno sestavo barjanskih rastlin.

Zažiganje je legalizirano s Hillovim aktom iz leta 1974 (Hill Farming Act 1947) in s kodeksom upravljanja (e.g. Anonymous 2000b). Pomaga odstraniti neokusno lesno rastlinstvo, npr. Calluna vulgaris in mrtvi opad, kot so ostanki modre stožke Molinia caerulea. Prav tako pospešuje rast mladih poganjkov. Ogenj, ki ni prevroč in se hitro giblje, ne povzroči velikih poškodb. Počasni, vroči požari pa lahko uničijo sfagnumske plasti in povzročijo vžig šote. Zažgano šoto rastline zelo težko ponovno naselijo, zato na takih površinah pogosto pride do erozije.

Ignoranca

Ignoranca pomeni odsotnost kakršnegakoli aktivnega upravljanja. Problem predstavlja le na tistih barjih, ki so na nek način že poškodovana in je večjega pomena pri visokih kot pri nizkih barjih. Navadno do tega pride, kadar barje obdajajo kmetijske površine. Običajno so robove barja obsekali ali drenirali, tako da se je barje nekoliko posušilo. Barja, na katerih se še pase živina, niso v nevarnosti. Ko pa je barje enkrat izolirano bodisi z ograjevanjem ali s spremembo gospodarjenja iz pašnega v sečno, se na območje naselijo drevesa, predvsem različne vrste brez, kar še pripomore k nadaljnemu izsuševanju barja in končnemu prehodu v gozd.

Paša

Paša tako domačih živali kot tudi srnjadi in jelenjadi na barju ni problematična. Seveda pa ima prevelika gostota živali lahko tudi negativne učinke., Na nizkem barju je na primer sprejemljiva gostota 0,5 ovce/ ha. Pri večji gostoti je požrte preveč vegetacije, zato se začne spreminjati vrstna sestava rastlin. Površina barja utrpi tudi škodo zaradi teptanja. Tudi to lahko vodi k spremembi obstoječih vrst ali celo do erozije.

Drugi vplivi

Atmosferska polucija in klimatske spremembe nedvomno tudi vplivajo na naravo in razmere na naših barjih, vendar pa zaenkrat prevladujejo bolj akutni vplivi razloženi zgoraj.

Mehanizmi varovanja

Zgornji katalog škodljivih vplivov na škotska barja lahko izpade kot dokaj moreče branje, kot nek

Protective mechanisms

The above catalogue of issues having an adverse effect on Scotland's bogs may make rather depressing reading and significantly reduced and degraded resource. However, that is only part of the story. Much is being done to safeguard those bogs that are still in good condition and to improve the condition of many of those that have been damaged. Such positive measures include:

- statutory designation
- development planning
- agri-environment schemes
- peatland management schemes
- grant aid
- forestry policy
- Biodiversity Action Plans
- Life Nature Programme
- awareness-raising
- site access and interpretation
- responses to wildlife crime

Statutory designation

The basic site protection mechanism in Scotland and the rest of Great Britain is the Site of Special Scientific Interest, designated under the Wildlife and Countryside Act 1981. Sites are selected accordingly to published criteria (NCC 1989, JNCC 1994). Once designated, the landowner or manager must consult with Scottish Natural Heritage (SNH) over any proposals that might have an adverse effect on the interest for which the site is protected, for example bogs. SNH then has the opportunity to influence the land management so that it is not damaging. This may include entering into a Management Agreement, whereby the land manager receives payment in return for sympathetic management.

With the introduction of the EU Habitats Directive, raised and blanket bogs can now benefit from stronger site-based protection through designation as Natura sites – Special Areas of Conservation (SAC). In Scotland, as in the rest of the Great Britain, most SAC are also SSSIs. The relative numbers of sites are summarised in Table 2. In addition to these key designations, others include: Ramsar site, National Nature Reserve, Local Nature Reserve and Wildlife Site. These offer varying degrees of protection and may, or may not, coincide with SSSI or cSAC status.

Development Planning

seznam ustrezno izbranih dejstev. Vendar pa je to samo del zgodbe. Veliko energije smo usmerili v varovanje tistih barij, ki so še vedno dobro ohranjena in v izboljšanje stanja mnogih, ki so že poškodovana. Pozitivni ukrepi vključujejo naslednje:

- zakonsko ureditev
- načrtovanje razvoja
- kmetijsko-ekološke programe
- načtr upravljanja z barji
- subvencije
- gozdno policijo
- akcijski načrti za biodiverziteto
- Life narava programi
- dvigovanje zavesti
- javni dostop do območij in izobraževanje
- reakcije na nezakonite posege v naravo

Zakonska ureditev

Glavni mehanizem varovanja pomembnih območij na Škotskem in v Veliki Britaniji je določitev "Področja, ki ima poseben pomen za znanost" (SSSI - Site of Special Scientific Interest), ki ga določa Wildlife and Countryside Act 1981. Ta območja so izbrana po določenih kriterijih (NCC 1989, JNCC 1994). Ko je tako področje enkrat določeno, se mora lastnik ali upravljalec o vsakem posegu na takem območju posvetovati s Scottish Natural Heritage (SNH), ki ima pravico vplivanja na upravljanje, tako da le to ne vodi v uničenje. To lahko vključuje tudi pripravo upravljalskega sporazuma, kjer lastnik zemljišča prejme določena sredstva v zameno za območju prijazno upravljanje.

Po sprejetju Habitatne direktive so visoka barja in nizka barja zavarovana v okviru programa Natura 2000 kot Posebna ohranitvena območja (SAC - Special Areas of Conservation). Na Škotskem, kot tudi v ostali Veliki Britaniji, je večina SAC območij tudi SSSI območij. Relativno število teh območij je prikazano v Tabeli 2.

Poleg tega so nekatera območja zavarovana tudi kot Ramsarske lokalitete, Nacionalni naravni rezervati, Lokalni naravni rezervati in Območja za divje živali. To nam omogoča različne stopnje varovanja, med karterimi mnoge sovpadajo s SSSI ali cSAC statusom.

Načrtovanje razvoja

Za večino sprememb v rabi zemljišča je potrebno dovoljenje lokalne oblasti. Ta deluje na podlagi

	Raised Bog / visoka barja	Blanket Bog / nizka barja
SSSI	60	~100
Candidate SAC	32	50

Table 4. Number of designated bog sites in Scotland. / Tabela 4. Število zavarovanih barij na Škotskem.

Most changes in land use require the permission of the Local Authority. This governed by various Acts of Parliament. In considering any application to change the use of land, the Local Authority engages in a public consultation exercise. Where a natural heritage issue arises, SNH has the opportunity to comment and this can often influence the nature of any development should it go ahead. For example, in a recent case a company wished to build a super-store close to a raised bog, and indeed part of the building would have been on top of the bog. Through the planning process, SNH and others were able to persuade the company to design the development in such as way as to be less damaging to the bog and to pay for the conservation management of the rest of the bog.

Agri-environment schemes

These can operate through a number of mechanisms. Under Scotland's Rural Stewardship Scheme, farmers can apply for payments for agreeing to manage their land in specific ways, for example agreeing to a particular grazing regime an a raised bog – a regime which is sensitive to the natural heritage interest but may not maximise the potential agricultural output. Under other mechanisms, farmers will only receive their support payments if they manage their land to a good standard, for example not heavily over-grazed and waste disposed of properly.

Peatland Management Schemes

SNH operates a number of Peatland Management Schemes, the largest applying to the blanket bogs of Caithness and Sutherland in the north and to the blanket bogs of Lewis in the Western Isles. In return for agreeing to managing their land according to a standard set of principles, normally for a period of 5 years, land managers receive modest area-based payments. The management practices covered by these schemes include:

- muirburn
- use of vehicles
- management of peat banks
- management of grazing

Most of the eligible land in these two important areas is now entered into these schemes. Thus the statutory safeguard affecting these sites (both are Natura sites) is complemented by a modest financial incentive to the land managers to manage the land in a way that benefits the natural heritage interest.

Grant Aid

In addition to entering into management agreements such as described above, agencies such as SNH can also offer one-off payments, or grants, for specific

različnih parlamentarnih aktov. Kadar nekdo želi spremeniti namembnost zemljišča, lokalna oblast to vključi v javno razpravo. Kjer se pokaže, da gre za pomembno naravno dediščino, se lahko vključi SNH s svojim komentarjem in vpliva na to ali bo prišlo do nekega posega ali ne. Na primer, neka družba je želela tik ob barju zgraditi ogromno skladišče, del stavbe naj bi bil celo na samem barju. Med samim načrtovanjem gradnje so imeli SNH in drugi možnost prepričati investitorja, da s svojo svoj poseg opravi tako, da čim manj vpliva na barje in da nameni določena denarna sredstva za načrt varovanja preostalega barja.

Kmetijsko-okoljski programi

Ti lahko delujejo preko različnih mehanizmov. Po Scotland's Rural Stewardship Scheme kmetje lahko zaprosijo za denarna sredstva, če upravljajo s svojo zemljo po določenih pravilih, na primer, da kosijo barja po posebnem režimu, ki omogoča ohranitev naravne dediščine in ne povečuje potencialne kmetijske proizvodnje. Drugi mehanizmi omogočajo kmetom samo pridobitev sredstev, če vzdržujejo svoje zemljišče v dobrem stanju, tako da npr. ne pasejo preveč in primerno odstranjujejo odpadne produkte.

Načrt upravljanja za barja

SNH upravlja številna barja, največja med njimi so blanked barja v Caithnessu in Sutherlandu na severu in nizka barja Lewisa in na zahodnih otokih. Kot povračilo za dovoljenje, da upravljamo njihova zemljišča po standardih in predpisih (ponavadi za petletno obdobje), dobijo lastniki zemljišč skromna sredstva. Upravljanje območja po teh vzorcih vključuje:

- zažiganje
- uporabo vozov
- upravljanje šotnega barja
- upravljanje pašnikov

Večina zemljišč v prej omenjenih področjih danes upravljamo na tak način. Zakonsko določeno varovanje teh območij (obe sta Natura območji) vključuje tudi skromno finančno spodbudo upravljalcem zemljišč, da jih upravljajo na način, ki omogoča ohranjanje le teh.

Subvencije

Poleg zgoraj opisanega načina upravljanja barij, agencije kot SNH lahko ponudijo tudi plačilo ali subvencijo za določeno delo. Na barjih tako vračamo

works. A typical example in relation to bogs would money to buy and install dams in drains, thus raising the water table and enhancing the condition of the bog.

Forestry Policy

The Forestry Commission, on behalf of the government, determines forestry policy in Scotland and the rest of Great Britain. Having previously actively encouraged forestry on deep peat, through tax incentives and grant aid, an appreciation of the importance of these habitats has led to revised policies which safeguard both raised and blanket bog. The Forestry Commission will now neither grant aid, nor permit without grant, the afforestation of any but the most degraded raised bogs, nor of blanket bog in good condition and extending to >25ha (Patterson & Anderson 2000). Indeed it is now possible to receive grant to help remove trees from bogs with a high nature conservation value.

United Kingdom Biodiversity Action Plans

As part of its contribution to the Convention on Biological Diversity, the UK government oversaw the preparation of series of Habitat and Species Action Plan to prevent the decline and promote the recovery of a range of habitats and species. Blanket Bog and Raised Bog were both identified as priority habitats and each has its own Habitat Action Plan (HAP) (Anonymous 1999). These follow a standard format:

- Current status
  - Biological status
  - Links with Species Action Plans
- Current factors affecting the habitat
- Current action
  - Legal status
  - Management, research and guidance
- Action Plan objectives and proposed targets
- Proposed action with lead agencies
  - Policy and legislation
  - Site safeguard and management
  - Advisory
  - International
  - Monitoring and research
  - Communications and publicity
- Costings
- Key references

For each HAP, or group of closely related HAPs, a Steering Group is established with responsibility for ensuring that the targets are met. The targets tend to be very ambitious, sometimes unrealistically so, but even if they are not met in their entirety, the process of highlighting issues and discussing these openly around the table with representatives from other agencies and organisations covering a wide variety of interests, is itself a step forward.

denar za nakup in postavitev jezov in drenaž in ohranjanje barij na ta način.

Upravljanje z gozdovi

Komisija za gozdove, ki je vladna služba, določa gozdarsko politiko v Škotski in ostali Veliki Britaniji. Po aktivnem spodbujanju gozdarjenja na debelih plasteh šote z ugodnimi davki in denarnimi spodbudami, je kasnejše spoznavanje pomembnosti teh habitatov pripeljalo do obratne politike, ki varuje tako visoka kot nizka barja. Komisija za gozdove danes ne subvencionira in ne dovoljuje pogozdovanja visokih barij, razen najbolj degradiranih. Prav tako ne dovoljuje pogozdovanja nizkih barij, ki so v dobrem stanju in presegajo 25 ha (Patterson & Anderson 2000). Danes je mogoče dobiti subvencijo za odstranitev dreves z barij velikega naravovarstvenega pomena.

Akcijski načrt biodiverziteto Združenega Kraljestva

Kot del sodelovanja pri uresničevanju Konvencije o Biološki Diverziteti, vlada UK nadzira vrsto Habitatnih in Vrstnih Akcijskih Načrtov za preprečevanje upadanja in pospeševanje obnove številnih habitatov in vrst. Nizka barja in visoka barja so bila določena kot prioritetna habitata in vsak ima svoj Habitat Action Plan (HAP) – Habitatni Akcijski Načrt (Anonymous 1999). Držita se enotne oblike:

- Sedanji status
  - Biološki status
  - Povezave z Vrstnim Akcijskim Načrtom
- Sedanji faktorji, ki vplivajo na habitat
- Sedanje akcije
  - Pravni položaj
  - Upravljanje, raziskovanje in vodenje
- Nameni in predlagani cilji Akcijskega Načrta
- Načrtovane akcije vodilnih agencij
  - Politika in zakonodaja
  - Varstvo in upravljanje območij
  - Svetovanje
  - Mednarodnost
  - Monitoring in raziskovanje
  - Obveščanje javnosti
- Stroški
- Ključne reference

Za vsak Habitatni Akcijski Načrt ali skupino načrtov je ustanovljena Nadzorna Skupina, ki je odgovorna za dosego načrtovanih ciljev. Cilji so večkrat zelo ambiciozni, včasih tudi nerealni. Vendar tudi če niso v celoti izpolnjeni, je proces osvetlitve problemov in razpravljanje o njih s predstavniki drugih agencij in organizacij z zelo različnimi interesi, tudi korak naprej.

Poleg nacionalnega Habitatnega Akcijskega Načrta obstajajo tudi Lokalni Biodiverzitetni Akcijski Načrti.

In addition to the national HAPs, there are also Local Biodiversity Action Plans (LBAPs). These identify local priorities and engage local people in the delivery of solutions. While integration of local and national BAPs is perhaps still not as complete as it should be, things are getting better, with increasing concentration on delivery of actions rather than the process itself.

Life Nature Programme

Scotland's bogs have benefited from 3 Life Nature projects. The first of these related to the extensive blanket bog in the north of Scotland and was linked to another project restoring blanket bog in Northern Ireland. The project contained a number of different elements:

- land purchase – the RSPB Reserve at Forsinard
- bog restoration (principally tree removal and drain blocking)
- demonstration of management techniques
- raising awareness
- green tourism
- environmental education

Two further projects are currently underway. One of these, now nearing completion, is on raised bogs. This project is mostly involved in tree removal and drain blocking, but there is also a more research-oriented element looking at the use of sheep to control invasive trees and scrub on bogs.

The other is again focussed on the Caithness and Sutherland Peatlands in the north of Scotland. This project is putting into practice on a much larger scale the restoration techniques learnt during the previous project. 1,400 ha of trees are to be felled and drains over an area of some 16,000 ha are to be dammed. Other elements of the project include an audit of damage, threat and risk across the site, which extends to around 145,000 ha. This audit has identified on-site drainage and adjacent forestry as the key threats.

A land use review has demonstrated that no one sector dominates the economy of the peatlands and surrounding area. Agriculture, forestry, nature conservation and tourism all contribute comparable amounts.

The final key element in the project is the development of a land use strategy for the area. The objective is to get all the key stakeholders to agree a set of common objectives for the future management and support of the area.

Awareness-raising

Making people more aware of the nature of bogs, their interest and how best to manage them is probably one of the most effective uses of resources. This can be

Ti identificirajo lokalne prioritete in vklapljajo lokalne ljudi v iskanje rešitev. Čeprav povezava ned lokalnimi in nacionalnimi Biodiverzitetnimi Akcijskimi Načrti mogoče še vedno ni tako popolna kot bi lahko bila, gredo stvari z osredotočanjem na izvrševanje akcij na bolje.

Life Narava program

Škotska barja dobivajo podporo 3 Life Natura projektov. Prvi se nanaša na obsežno nizko barje na severu Škotske in je bil povezan s projektom obnove nizkega barja na severu Irske. Projekt vsebuje številne različne elemente:

- najem zemlje – RSPB Rezervat v Forsinardu
- obnova barij (v glavnem odstranitev dreves in ustavitev drenaže)
- demonstracija tehnik upravljanja
- večanje zavesti
- zeleni turizem
- okoljsko izobraževanje

Trenutno potekata dva projekta. Prvi, ki je blizu zaključku, poteka na visokem barju. Ta projekt se v glavnem vključuje v odstranitev dreves in ustavitev drenaže, del projekta pa je namenjen raziskavi uporabe ovc pri preprečevanju naseljevanja invazivnih vrst dreves in grmov na barju.

Drugi projekt je spet osredotočen na šotna območja Caithnessa in Sutherlanda na severu Škotske. Ta projekt v večjem obsegu praktično izvaja v prejšnjem projektu usvojene obnovitvene tehnike. Podrtih bo 1.400 ha dreves in uničene drenaže na okoli 16.000 ha. Ostali deli projekta so pregled škode, groženj in tveganj na območju, ki se razprostira na okoli 145.000 ha. Pokazalo se je, da sta glavni grožnji izsuševanje in gozdarjenje.

Pregled rabe zemlje je pokazal, da noben sektor ne prevladuje pri ekonomiji šotišč in območij v okolici. Kmetijstvo, gozdarstvo, varstvo narave in turizem prispevajo primerljive deleže.

Končni ključni element projekta je razvoj strategije uporabe zemlje za projektno območje. Cilj je privolitev vseh glavnih interesentov na območju, da sprejmejo skupne cilje za nadaljno upravljanje in vzdrževanje območja.

Dvigovanje zavesti

Dvigovanje zavesti ljudi o pomenu barij, posredovanje zanimivosti narave na barjih in kako najbolje skrbimo zanjo, je verjetno eno najbolj učinkovitih načinov uporabe sredstev. Sem spada:

- Publikacije: ki so lahko tako strokovne kot poljubne. Nekaj primerov strokovne:
  - Ohranjanje barij: priročnik za upravljanje (Brooks &

done in a number of ways, some of which are referred to above. These include:

- Publications: which can be either technical or popular. Examples of the former include:
  - Conserving Bogs: the management handbook. (Brooks & Stoneman 1997)
  - Deforesting and Restoring Peat Bogs (Anderson 2001)

  and of the latter:
  - Boglands (Anonymous 1995)
- Exhibitions

SNH developed and presented to the general public an exhibition entitled 'Wild, Wet and Wonderful'. It was all about bogs and toured the country for over a year, with venues varying from one of the largest museums in the country (Kelvingrove, Glasgow) to small village halls and schools. By putting the exhibition in places where people are going to go anyway, it reached a large audience. It was also tied in with materials prepared for school children, thus helping to reinforce the key messages.

Public access to sites

This can be done in a number of ways and clearly has to be managed according to the sensitivity of the site. It may be a simple boardwalk on to a site, with little in the way of interpretation. At the opposite extreme it could be linked to a visitor centre.

In a very industrial part of Scotland, a very damaged bog on the edge of an area of poor housing and high unemployment has been incorporated into park where people can go for walks and other forms of exercise. Although the bog has lost most of its original interest through peat cutting and the extraction of minerals from beneath the peat, enough remains to be able to demonstrate to people something of the history of the bog since it first began to develop, together with some of the animals and plants still found there. By linking the development of the bog with the human history of the area the relevance of the bog can be appreciated by those who might otherwise have no interest in it.

Responses to wildlife crime

Although not a major issue in Scotland, people have been illegally removing Sphagnum moss from some of our bogs for use in the horticultural trade – mostly for hanging baskets for flowers. A programme on the television highlighted this and other aspects of wildlife crime (poisoning of raptors, digging up wild flowers etc) to help people value what they have and to realise that we all have a role to play in ensuring that it remains for everyone to enjoy.

Stoneman 1997)
- Krčenje gozda in obnavljanje šotnih barij (Anderson 2001)
- Barja (Anonymous 1995)

- Razstave

SNH je pripravil in širši javnosti predstavil razstavo z imenom »Wild, Wet and Wonderful« – divje, mokro in čudovito. Na njej je bilo vse o barjih in je potovala po deželi dlje kot leto s postavitvami tako v enem največjih muzejev (Kelvingrove, Glasgow) kot v majhnih vaških dvoranah in šolah. S postavljanjem razstave povsod kamor hodijo ljudje, je dosegla številno občinstvo. Združena je bila z delitvijo gradiva za šolske otroke, tako da je še lažje dosegla svoj cilj.

Javni dostop do območij

Lahko se ga uredi na različne načine in mora biti jasno ustrezno voden upoštevajoč občutljivost območja. Lahko je to preprost sprehod z malo razlagami, drug ekstrem pa je celotni center za obiskovalce.

V zelo industrializiranem delu Škotske so precej uničeno barje na robu območja z visoko brezposelnostjo vključili v park, kamor se ljudje hodijo sprehajt ali ukvarjat z drugimi športi. Kljub temu, da je barje izgubilo že precej svojih tipičnih lastnosti zaradi odstranjevanja šote in izkoriščanja mineralov, pa je še vedno ohranilo dovolj značinosti, da lahko ljudem prikažemo, kako je barje nastalo in se razvijalo in nekaj tipičnih rastlinskih in živalskih vrst, ki jih še vedno najdemo tam. Zgodovino barja smo povezali tudi s človeško zgodovino tega območja in jo tako predstavili ljudem, ki se sicer s to tematiko ne bi ukvarjali.

Reakcije na nezakonite posege v naravo

Ljudje na Škotskem nezakonito odnašajo sfagnumske mahove iz barja in jih uporabljajo v vrtnarstvu, predvsem za viseče cvetlične košare. Ta in drugi problemi (zastruplanje plazilcev, izkopavanje divjega cvetja, itd.) so bili predstavljeni tudi v televizijski oddaji. Na ta način smo želeli ljuden predstaviti pomen in vrednost narave in jih opozoriti, da je pri njenem ohranjanju pomemben vsak posameznik.

Zaključki

Škotska barja so utrpela mnogo škode zaradi različnih človekovih aktivnosti. Kljub temu, da so bila mnoga barja uničena ali poškodovana, pa so se mnoga med njimi ohranila skoraj nedotaknjena. Danes vemo, da

Conclusion

Scotland's bogs have suffered considerably from a variety of pressures as people have sought to exploit them in different ways. However, although much has been lost and damaged, significant areas still exist in a relatively natural condition. As bogs have come to be valued for their own intrinsic interest, increasing resources have been directed towards safeguarding the remaining good examples and restoration of damaged areas. While further, small losses are perhaps inevitable, there is every reason to be moderately optimistic about the prospects for bogs in the future.

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so barja taka kot so nekaj vredna, zato želimo tista, ki so se do danes ohranila nespremenjena varovati in renaturirati tista, ki so poškodova. V prihodnosti lahko pričakujemo še kakšno manjšo izgubo barjanskih površin, v glavnem pa smo lahko optimisti glede prihodnosti teh tako nenavadnih življenjskih okolij.

Zahvale

Zahvaljujem se vsem, ki so mi omogočili, da sem se lahko udeležil strokovnega posveta Barja in varstvo narave:

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Daniele De LUCA, Damijana OTA, Rolando MARINI

PROJEKT LIFE - NATURA: IZVIRI REKE STELLA V FURLANSKI NIŽINI

Life - natura project: Springs of the river Stella in the Friuli plain

Namen projekta je ohranitev in varstvo mokrišč, predvsem bazičnih nizkih barij in vlažnih travnikov, ki so se ohranila na območju izvirov reke Stella. V nizkih barjih rastejo endemske in redke rastlinske vrste kot Armeria helodes, Erucastrum palustre, Centaurea forojuliensis, Euphrasia marchesettii. Za ohranitev naravnega okolja smo pokosili nizka barja in vlažne travnike ter odstranili z njih grmovje. Za preprečevanje znižanja podtalnice smo zasuli nekaj odtočnih jarkov.
Namen projekta je bil tudi širjenje naravnih okolij za ogrožene vrste in smo zato opravili nekaj renaturacijskih posegov na kmetijskih zemljiščih, ki so nastala pred več kot 50 leti z zasipavanjem barij. Material zasipavanja smo odstranili in na novo nastala območja so se poplavila in se v njih sedaj naseljuje vodno in močvirno rastlinstvo.

The aim of the Life NATURA project is the conservation and safeguarding of wetlands, in particularly alcaline fens and wet meadows, that survived in the area of the river Stella. In the fens rare and endemic plants are present as Armeria helodes, Erucastrum palustre, Centaurea forojuliensis, Euphrasia marchesettii. To preserve the natural habitat grass cutting and bush removing were done in fens and wet meadows. To maintain the water in the ground some drainage channels were closed.
To enlarge the natural habitat of the endangered plant species renaturation works have also been done on some agricultural properties that were obtained more than 50 years ago by covering the fens with different material. This material has been removed and the new areas were flooded and are now colonized by aquatic and wetland vegetation.

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Uvod

Projekt Life – Natura Izviri reke Stella B4-3200/98/479 smo začeli leta 1999 in zaključili leta 2002. Izvedli smo ga na območju velike m 65 ha, ki se nahaja v dveh naravnih deželnih biotopih: Izviri pri Vircu in Izviri pri Flambru.

Izviri reke Stella se nahajajo v Občinah Talmassons in Bertiolo, v bližini Palmanove, in spadajo v širše območje izvirov, ki prečka furlansko nižino na predelu, kjer zgornja prehaja v spodnjo. Nižini se razlikujeta v zgradbi podlage: zgornja je sestavljena iz prodnega zasipa in je zato prepustna za vodo. Spodnjo nižino pa sestavljajo neprepustne plasti gline in peskov. Voda, ki pronica v tla v zgornji nižini, se pretaka proti morju podzemsko, ter mezi iz tal tam, kjer sreča neprepustne plasti spodnje nižine. Tu so zato nastala obsežna območja mokrišč z izviri, močvirji in rekami, ki se izlivajo v Maransko in Gradeško laguno.

Voda, ki tu mezi iz tal je čista, bistra, ni onesnažena, z visoko vsebnostjo kalcija in magnezija; njena srednja temperatura je 13°C, ki se v teku leta spremeni le za stopinjo ali dve. Njen pH je okrog 7,7. Nivo vode niha v teku leta: najvišji je po spomladanskih in jesenskih padavinah.

Zaradi različne vsebnosti vode v tleh in zaradi razgibane površine tal so tu prisotna različna okolja:

a) razni izviri, imenovani olle;
b) bazična nizka barja, kjer je podlaga stalno zasičena z vodo;
c) vlažni travniki so na rahlo dvignjeni podlagi, ki je občasno poplavljena;
d) suhi travniki so na se višji in torej bolj suhi podlagi;
e) tekoče vode;
f) obrečni vrbovi in topolovi gozdovi ob rekah;
g) močvirni gozd črne jelše (Alnus glutinosa) na občasno poplavljenih predelih;
h) nižinski gozd z gradnom (Quercus robur), brestom (Ulmus minor) in ozkolistnim jesenom (Fraxinus angustifolia).

Najpomembnejše okolje, ki je tudi evropskega pomena, je bazično nizko barje (združba Erucastrum-Schoenetum nigricantis Poldini em. Sburlino&Girelli 1994) z endemskimi vrstami, ki so zelo ogrožene zaradi krčenja tega habitata.

Od evropsko pomembnih habitatov so tukaj prisotni se: apnenčasto močvirje s Cladium mariscus in Carex davalliana (prioritetnega pomena) ter vlažni travniki z modro stožko Molinia coerulea (združba Plantago altissimae-Molinietum coeruleae (Pign.1953) Marchiori&Sburlino 1982)). Še posebej so zanimivi vlažni travniki, kjer sta ob M. coerulea prisotni Allium suaveolens in Primula farinosa.

Na območju izvirov reke Stella raste 17 rastlinskih vrst iz rdečega seznama za Italijo, od katerih jih 11 raste ravno v bazičnih nizkih barjih.

Introduction

The Life – Natura project 'Springs of the river Stella' (B4-3200/98/479) began in 1999 and was completed in 2002. The project was implemented in an area of 65 ha which is part of two regional biotopes: the springs at Virco and the springs at Flambro.

The springs of the river Stella are located in the municipalities Talmassons and Bertiolo, near Palmanova, and are part of the wider area of springs which transects the Friuli Plain in the section where the upper plain transcends into its lower part. The two parts of the plain differ in bedrock structure: the upper part is composed of gravel sediment and is water permeable, whereas the lower part is composed of impermeable layers of clay and sand. The water penetrating into the ground in the upper plain flows underground towards the sea, and oozes out of the ground as it strikes upon the impermeable layers of the lower plain. It has created an extensive wetland area with springs, wetlands and rivers draining into the lagoons of Marano and Grado.

The water exuding from the ground is clean and pure, unpolluted, with high calcium and magnesium contents; its mean temperature is 13 °C, and only changes by one or two degrees throughout the year. The pH value of the water is about 7.7. Water level fluctuates and is highest after spring and autumn rains.

Owing to varying water content in the ground and undulating relief, different types of environment can be found in this area:

a) various springs, called „olle";
b) alkaline fens with constantly inundated soil;
c) wet meadows on slightly elevated ground exposed to occasional floods;
d) dry meadows on higher and therefore drier land;
e) running waters;
f) alluvial willow and poplar forests;
g) bog alder forests (Alnus glutinosa) growing on occasionally flooded terrain;
h) lowland forests of holm oak (Quercus robur), elm (Ulmus minor) and narrowleaf ash (Fraxinus angustifolia).

The most important habitat in the area and aslo a habitat of European importance is alkaline fen (Erucastrum-Schoenetum nigricantis Poldini em.Sburlino&Girelli 1994) with its endemic species, some of which are severely threatened by the decrease in the size of the habitat.

Other habitats of European importance are: calcareous fens with Cladium mariscus and Carex davalliana (priority habitat type) and wet meadows with Molinia coerulea (Plantago altissimae-Molinietum coeruleae (Pign.1953) Marchiori&Sburlino 1982)). Particularly interesting are wet meadows with Allium suaveolens and Primula farinosa growing besides M. coerulea.

In the area of the Stella springs we can find 17 plant species listed in the Red List for Italy, 11 of them in alkaline fens.

Z vidika flore rastejo v bazičnih nizkih barjih tri endemske vrste evropskega pomena, in sicer Armeria helodes (prioritetna), Erucastrum palustre in Euphrasia marchesettii, ter še dve endemski vrsti Centaurea forojuliensis in Senecio fontanicola. Floro tega območja bogatijo glacialni relikti kot Primula farinosa, Pinguicula alpina, Drosera rotundifolia, Eriophorum latifolium, Gentianella pilosa, Iris sibirica, Hemerocallis lilio-asphodelus, ki so gorske vrste, katerim pa hladna voda v podlagi zagotavlja ugodne življenjske razmere tudi v nižini.

Nekaj zgodovine

Obsežnost mokrišč na območju izvirov reke Stella se je zaradi melioracij začelo krčiti v tridesetih letih prejšnjega stoletja in obsega danes le še 5% svoje prvotne površine. Izsuševanja mokrišč z izkopavanjem drenažnih kanalov so se nadaljevala še po drugi svetovni vojni. Mnoga močvirja in nizka barja so bila zasuta z raznimi materiali, ki so nato postali podlaga za obdelovalne površine. Izsušeni vlažni travniki, ki so bili do tedaj primerni le za košnjo, so tako postali primerni za obdelovanje.

V sestdesetih letih je drenažo vode pospešila zaradi gradnje ribogojnic za postrvi, ki so zaradi svojih visokih potreb začele črpati vodo iz tal.

Poleg teh lokalnih dejavnikov, ki so negativno vplivali na vsebnost vode v tleh, se je v tistih letih začelo splošno znižanje vode talnice, ker so jo zaceli črpati v zgornji furlanski nižini v industrijske in kmetijske namene.

Pomanjkanju vode je treba dodati še dejstvo, da se je zaradi razvoja kmetijstva in opuščanja hlevov, povpraševanje po senu in stelji zmanjšalo in je tako prenehala košnja barij in vlažnih travnikov. Košnja je bila pomemben dejavnik za ohranitev značilne flore v teh naravnih okoljih, ker se je na ta način vzdrževalo oligotrofijo podlage in preprečevalo senčenje heliofilnih barjanskih rastlin.

Tista nizka barja, ki niso bila izsušena ali zasuta, so se tako zaradi pomanjkanja košnje ter znižanja podtalnice počasi zakopnila in preraslo jih je grmovje. Mnoge vrste, med katerimi tudi endemske, ki so vezane na oligotrofna in svetla barja, so izginile ali postale zelo redke.

Danes je na tem območju prisotnih le še nekaj mokrišč (približno 200 ha skupne površine), ki so majhna po površini, razdrobljena in obdana s kmetijskimi površinami.

Varstvo in projekt Life - Natura

Čeprav je to območje iz naravoslovnega vidika izredno pomembno in so predvsem botaniki že v 70 letih zahtevali njegovo varstvo, so bila prva zavarovana

In terms of flora, alkaline fens are the habitat of three endemic plant species of European importance, namely Armeria helodes (priority species), Erucastrum palustre and Euphrasia marchesettii, and another two endemic species Centaurea forojuliensis and Senecio fontanicola. The flora of the area is further enriched with glacial relict species such as Primula farinosa, Pinguicula alpina, Drosera rotundifolia, Eriophorum latifolium, Gentianella pilosa, Iris sibirica, Hemerocallis lilio-asphodelus, all of them mountain species which are ensured favourable living conditions in the valley by the cold water in the bedrock.

Historical overview

Massive reclamation works carried out in the 1930s resulted in a decrease in the number and size of wetlands in the area of the Stella springs, which today only cover approximately 30 % of their original surface. Wetland drainage by means of drainage canals continued also after World War II. Many marshlands and fens were filled in with various types of material on which arable land developed. Drained wet meadows, which had only been fit for mowing, became suitable for cultivation.

In the 1960s, water drainage was increased because of the construction of trout farms which began to pump water from the ground to meet their high needs. In addition to these local factors, which had adverse effects on the water content in the ground, a general reduction in the water table of subterranean water began as the water started to be pumped in the Upper Friuli Plain for the needs of industry and agriculture.

Water shortage, along with the fact that demand for hay and bedding decreased because of fast development of agriculture and abandonment of cowsheds and stables, brought an end to the mowing of bogs and wet meadows. Mowing used to be an important factor in maintaining the typical flora of these natural areas since it helped preserve the oligotrophy of the bedrock and prevented the shadowing of heliophilic bog plants.

The fens that were not drained or filled in have gradually dried out due to absence of mowing and a lower ground water table and have gradually become overgrown by bushes. Many species, some of them endemic, which are linked to oligotrophic and light bogs have disappeared or become very rare.

Today, there are only a few wetlands left in the area (app. 200 ha of total surface), which are small in size, fragmented and surrounded by agricultural land.

Protection and the Life – Natura project

Although the area is very important in terms of nature science and botanists put forward proposals for its

območja ustanovljena šele leta 1998, in sicer 3 naravni deželni biotopi: izviri pri Vircu (80 ha), izviri pri Flambru (71) ter izviri Zarnicco (47 ha).

Istega leta je bilo območje izvirov reke Stella predlagano za Območje evropskega pomena v smislu Direktive Habitat ter je bil odobren projekt Life - Natura Izviri reke Stella, ki ga je predložilo Deželno ravnateljstvo za Parke pri Avtonomni deželi Furlaniji - Julijski Krajini. Namen projekta je bilo varstvo evropsko pomembnih endemskih vrst z vzdrževanjem in s širjenjem njihovega naravnega okolja (bazično nizko barje) ter vzpostavitev prvotne biološke raznovrstnosti v barjih. Namen projekta je bil tudi ustvariti nova okolja za ogrožene vrste z renaturacijo nekaterih kmetijskih zemljišč, ki so nastala na zasipanih mokriščih.

Projekt se je odvijal na približno 65 ha zemljišč v dveh naravnih deželnih biotopih (Izviri pri Vircu in Izviri pri Flambru), od katerih je bilo potrebno odkupiti približno 32 ha. Ostala zemljišča so že bila v lasti Občine ali Dežele.

Posegi za vzdrževanje in širjenje naravnih okolij nizkega barja ter vlažnih travnikov

Obstoječa nizka barja, ki so bila desetletja zapuščena, in nekaj vlažnih travnikov (skupna površina: 25 ha) so bili od leta 1999 vsaj enkrat ali dvakrat na leto pokošeni. Grmovje na njih (Frangula alnus in Alnus glutinosa) je bilo posekano in vsako leto so bili odstranjeni brsti, ki so poganjali iz štorov. Pokošen in posekan rastlinski material je bil odstranjen, da se ne bi mineraliziral in tako obogatil podlago.

Na barjih sta bili košnja in sečnja, kakor tudi ostranitev materiala, opravljeni ročno, kajti zaradi mehke šotne podlage in prisotnosti vode je bil dostop s stroji onemogočen.

Z namenom, da bi lahko vsaj lokalno vplivali na zvišanje nivoja podtalnice, smo zasuli nekaj manjših drenažnih kanalov.

Posegi renaturacije

Te smo opravili v bližini že obstoječih barij, in sicer na kmetijskih zemljiščih, ki so nastala z zasutjem mokrišč. Zgornje plasti prsti, bogate z gnojili in semeni kulturnih rastlin in plevelov, ter spodaj ležeči material, ki je bil pred desetletji uporabljen za zasutje, smo odstranili do prvotnih plasti šote. Kjer teh plasti šote ni bilo, ali kjer šota ni bila več razpoznavna zaradi oranja in mešanja, smo kopali do plasti gramoza, na kateri je včasih stalo mokrišče. Globina izkopa je bila največ 80 cm. Izkopane predele je poplavila voda podtalnica in se je vanje naselilo vodno in močvirno rastlinstvo.

Višje predele izkopa, ki jih voda poplavi le občasno, smo posejali s semeni, ki smo jih sami nabrali na nekaterih še naravnih vlažnih traviščih v okolici. S tem

protection in the 1970s, the first protected areas were only designated in 1998, taking the form of 3 natural regional biotopes: Springs at Virco (80 ha), Springs at Flambro (71) and the Zarnicco Springs (47 ha).

In the same year, the Stella springs were proposed as an Important European Area within the meaning of the Habitats Directive, and the project Life – Natura 'Springs of the river Stella', proposed by the Regional Authority for Parks of the Autonomous Region Friuli Venezia Giulia, was approved. The aim of the project was to protect endemic species of European importance through maintainance and expansion of their natural habitat (alkaline fen) and to restore original biological diversity in bogs. Another purpose of the project was to create new areas for endangered species through restoration of some agricultural land which had developed on drained wetlands.

The project was carried out on an area of about 65 hectares in two natural regional biotopes (Springs at Virco and Springs at Flambro), 32 hectares of which had had to be bought. The remaining part of the land was already owned by the Municipality or the Region.

Measures for maintenance and expansion of the natural environment of fens and wet meadows

The existing fens which were deserted for decades, and a few wet meadows (total surface area: 25 ha) have been mowed at least once or twice a year since 1999. The bushes (Frangula alnus and Alnus glutinosa) have been regularly cut and every year the sprouts bursting out of bush trunks have been removed. Mowed and cut-off vegetation material has been removed in order to prevent mineralisation of the material and subsequent enrichment of the soil basis.

In the bogs, mowing, logging and the removal of vegetation material is performed manually, as the soft peat ground and water presence make machine access impossible.

In order to achieve an increase in the local ground water table, several small drainage canals have been filled in.

Restoration measures

Restoration measures took place in the vicinity of existing bogs, on the agricultural land formed as a result of wetland fill in. The upper layers of soil, rich in minerals and seeds of cultivated plants and weeds, were removed along with the underlying material which was used for wetland fill in decades ago, until the upper layers of peat were revealed. If there was no peat or it was no longer recognisable because of ploughing and mixing of layers, we dug further until we reached the gravel layer on which the wetland used to be based. The maximum depth of the dug out hole was 80 cm. These dug out holes were flooded

smo tudi preprečili naselitev kulturnih rastlin ali plevelov z bližnjih kmetijskih zemljišč.

Renaturiranih je bilo tako 18 ha zemljišč in odpeljanih je bilo 40.000 m^3 materiala.

V tako na novo nastalih mokriščih naj bi zaradi kopičenja odmrlega rastlinstva počasi začela nastajati šota in naj bi se tako začela ustvarjati nova primerna podlaga za naselitev barjanskih rastlin.

Da bi ta proces nastajanja šote pospešili, smo v nekatere na novo poplavljene predele poskusno stresli nekaj bazične šote in komposta ter nekaj rastlinskega materiala pokošenega na barjih. Po dveh letih je ta material že nekoliko podoben šoti in nameravamo nanj sejati ali presaditi barjanske rastline.

Ostale dejavnosti

V okviru projekta so bila opravljena tudi botanična in zoološka raziskovanja, ki se še nadaljujejo. Botaniki iz Univerze v Trstu so popisali rastlinske vrste (skupno 287 vrst) in združbe (7) in so sledili spontani kolonizaciji renaturiranih površin. Na območju izvajanja projekta Life so opravili analizo populacij dveh najbolj ogroženih endemskih vrst, in sicer Armerie helodes in Erucastruma palustre. Štetje osebkov je pokazalo, da je A.helodes prisotna s približno 2200 osebki, E.palustre pa le z okrog 90 osebki. Če upoštevamo, da je na celotnem območju izvirov reke Stella bilo preštetih le 300 osebkov te vrste, je ta podatek zelo zaskrbljujoč. Bodoča raziskovanja naj bi se razširila se na biologijo obeh vrst, predvsem na njune fiziološke lastnosti.

Zoološka raziskovanja so zajela popis ptic (176 vrst, od katerih jih je 34 na seznamu Direktive Ptice) in pa popis nekaterih skupin nevretenčarjev, in sicer mehkužcev, rakov in z žuželk (enodnevnice, kačji pastirji, kobilice, hrošči, metulji). Od teh so bile tukaj najdene 4 vrste iz seznama Direktive Habitat: Vertigo angustior, Lucanus cervus, Coenonympha oedippus in Austropotamobius pallipes.

V okviru projekta smo organizirali tudi dejavnosti osveščanja javnosti, predvsem lokalnega prebivalstva. Poleg predavanj in raznih srečanj smo organizirali oglede območja, kjer smo izvedli posege. Postavili smo naravoslovno učno pot s poučnimi tablami tudi z namenom usmerjanja obiskovalcev stran od najbolj dragocenih predelov. Tiskali smo plakate in brošure, v bližnji šoli pa smo pripravili začasno razstavo s tablami in maketo območja izvirov. V bližini naravoslovne učne poti bomo s sredstvi, ki smo jih pridobili iz drugih virov, v kratkem uredili informacijsko središče, in sicer z obnovo starega mlina.

by ground water and settled by aquatic and wetland vegetation.

Occasionally flooded higher parts of the holes were sown with seeds picked in some of the nearby natural wet grasslands. Thus we attempted to prevent settlement of cultivated plants or weeds from the agricultural areas nearby.

A total of 18 ha of land was restored and approximately 40,000 m^3 of material were removed from the site.

In newly created wetlands, accummulation of dead vegetation was supposed to lead to peat creation and gradually to the formation of new appropriate basis for the settlement of bog vegetation.

In order to accellerate the peat creation process, small quantities of alkaline peat and compost were thrown on the flooded land together with some mowed vegetation material from the bogs. Two years later, this material already resembles peat and we intend to sow or plant bog plants into it.

Other activities

In the course of the project we also carried out botanical and zoological research. The botanists of the University of Trieste recorded all plant species (287 species) and plant associations (7), monitoring natural colonisation of restored areas. In the project area, we performed an analysis of the populations of two most endangered endemic species, namely Armerie helodes in Erucastruma palustre. Plant population count, however, showed that A. helodes is present with approximately 2200 specimens whereas there were only 90 specimens of E.palustre. Considering that in the entire area of the Stella springs only 300 specimens of this species were counted, the information is highly alarming. Future research should focus on the biology of both species, and their physiological features in particular.

Zoological research tasks included bird counts (176 different species, 34 of which are listed in the Birds Directive Annex) and a record of some groups of invertebrates such as molluscs, shrimps and insects (mayflies, dragonflies, grasshoppers, beetles, butterflies). We also found four species listed in the Habitats Directive: Vertigo angustior, Lucanus cervus, Coenonympha oedippus and Austropotamobius pallipes.

Awareness-building activities aimed at the local population were organised as part of the project. In addition to lectures and various meetings, sightseeing tours of the intervention area were organised. A nature trail with information boards was set up to direct visitors away from the most precious sites. We have published posters and brochures, and organised a temporary exhibition with info boards and a map of the springs. Funds obtained from other sources will be used to renovate an old mill and convert it into an information centre near the nature trail.

Zaključki

V okviru pričujočega projekta Life smo opravili prve in osnovne posege za rešitev obstoječih barij in vlažnih travnikov in s tem tudi endemskih rastlinskih vrst. Ta okolja pa potrebujejo stalno vzdrževanje, tako da se morata košnja in sečnja nadaljevati. Slediti je treba tudi razvoju rastlinstva in s tem preveriti učinke in posledice naših posegov.

Posebno pozornost zahteva vrsta Erucastrum palustre, kajti raziskave so pokazale, da se je življenjsko območje te vrste in število osebkov drastično znižalo v zadnjih desetletjih in da tej vrsti dejansko grozi izginotje pred našimi očmi.

Tudi renaturirane površine potrebujejo stalno vzdrževanje. Slediti je treba spontanemu naseljevanju rastlinstva in je treba odstranjevati nezaželene vrste, ki prihajajo iz bližnjih kmetijskih zemljišč. Slediti je treba nastajanju šote in omogočiti naseljevanje barjanskih rastlin. Kontrolirati je treba pretok vode in če je potrebno njen tok tudi preusmeriti.

Za vse to so potrebna sredstva, ki jih trenutno zagotavlja Deželna Uprava, v bodoče pa nameravamo črpati še dodatna sredstva iz drugih virov.

Največji problem za mokrišča ob izvirih reke Stella pa je brez dvoma voda podtalnica, katere nivo se počasi in neprenehoma znižuje po vsej furlanski nižini, čemur so pripomogle tudi suše zadnjih let. Temu pojavu lahko v manjši meri kljubujemo le lokalno z manjšimi posegi (zasipavanje drenažnih kanalov), v pričakovanju, da bo prišlo do bolj smotrnega upravljanja z vodo na širši deželni ravni.

Conclusions

Within the framework of the presented project, the first and most essential interventions were carried out to preserve the existing bogs and wet meadows and, consequently, endemic plant species. These areas, however, need to be regularly maintained, which is why mowing and logging activities may not be discontinued. However, this is only possible if we keep up to date with the development of vegetation and constantly monitor the effects and consequences of our actions.

Special attention shall be given to Erucastrum palustre, as research has shown that the habitat and the number of specimens of this species has decreased dramatically over the last decades and that the species is actually facing extinction before our very eyes.

Restored areas need constant maintenance. We need to monitor the natural settlement of vegetation and remove undesired species entering the area from the neighbouring farms. We need to monitor peat creation and facilitate settlement of bog vegetation. The flow of water has to be controlled and, if necessary, modified.

It all requires extensive funds which are currently provided by the regional government, but in the future we aim to obtain additional financial support from other sources.

The main problem of the wetlands along the springs of the river Stella is undoubtedly ground water whose level has been decreasing slowly but continuously in the entire Friuli Plain. Severe droughts in recent years have only made the problem worse. The phenomenon can partly be fought locally with minor interventions (filling-in of drainage canals) and with firm expectations that more sustainable water management will be introduced on a wider regional level.

Martin ŠOLAR

VAROVANJE NARAVNIH VREDNOT V LUČI KATEGORIJ IUCN ZA ZAVOVAROVANA OBMOČJA

Protection of natural values in perspective of IUCN categories for protected areas

Deli narave, spoznani kot naravne vrednote, so pravzaprav le zelo majhen delež vsega naravnega okolja. Naravovarstveniki se danes bolj kot kdaj koli zavedamo, da je celostno varovanje narave v obliki zavarovanih območij oziroma v obliki varstva habitatov učinkovitejše kot točkovno varstvo posameznih naravnih vrednot. Pri varovanju in upravljanju zavarovanih območij smo naravovarstveniki dolžni slediti naravovarstvenim usmeritvam, ki stremijo k uveljavljanju upravljavskih ciljev za zavarovana območja, ki edini zagotavljajo varstvo, ohranitev in sonaravni razvoj v skladu s cilji zavarovanja in upravljanja. Res je, da so cilji upravljanja v zavarovanih območjih lahko specifični glede na različne fizično geografske in biotske danosti, glede na lastništvo in interese, vendar nek skupen imenovalec mora obstajati. Celostno varovanje narave v okviru zavarovanih območij je edino resnično zagotovilo za ohranitev naravnih vrednot in ekosistemov. Tako varovanje lahko dosežemo samo na osnovi jasno določenih ciljev upravljanja. varstva najbolj vrednih delov narave. Upravljavske kategorije IUCN za zavarovana območja in njihove definicije so prav gotovo lahko tisto merilo za upravljanje parkov, ki zagotavljajo uresničevanje naravovarstvenih parkovnih ciljev, do neke mere pa tudi primerljivost med zavarovanimi območji. Varovanje in upravljanje naravnih vrednot v zavarovanih območjih lahko naprej in podrobneje ustrezno izvajamo le na osnovi premišljenega strokovnega pristopa in z instrumenti prostorskega načrtovanja. Na ta način lahko v prostoru izločimo območja (cone) urejanja in upravljanja, v katerih so mesto, način in oblika različnih dejavnosti natančno opredeljeni.

Some parts of nature recognised as natural values are in fact only a small share in entire natural environment. Nature conservators have never been more conscious of the fact that protection of nature as a whole in protected areas or protected habitats is more efficient than protection of separate natural values. Nature conservators are in their work of protecting and managing obligated to respect directives which lead to reach defined aims for protected areas and are the only ones to assure protection, preservation and sustainable development in conformity with the aims of protecting and managing. The fact is that the aims of managing in protected areas can be specific according to different geographical and biotic characteristics, ownership and interests, but a common denominator has to be found. Entire protection of nature within protected areas is the only way to assure the preservation of natural values and ecosystems. Such protection can be reached only on the base of clearly determined aims. IUCN management categories for protected areas and their definitions are certainly a measure to exercise protective aim of parks as well as comparison among protected areas. Protection and managing of natural values in protected areas can be exercised more precisely in the future only on the base of well considered professional manners and with the instruments of environmental planning. This way certain areas (zones) can be eliminated where location, method and activities are well determined.

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1 Uvod

Na prelomu tisočletja, v času sprememb družbenega sistema v tranzicijskih državah in prehoda k novim integracijam se naravovarstveniki spet enkrat soočamo s temeljnim vprašanjem: Kako varovati naravo, njene najbolj vredne dele in jih ohranjati za naslednje generacije. Odgovor oziroma pot nista lahka, povrh vsega pa živimo v času, ko so mnoge vrednote manj ali celo nepomembne. V javnosti celo prevladuje mnenje, da naravovarstvena stroka ne obstaja, na ta način se že vnaprej odklanja rešitve in delo, ki imajo za posledico varovanje narave ali vsaj nekaterih njenih delov. Mar se ne zavedamo, da je celo obstoj človeka samega povsem odvisen od narave oziroma njenih virov? Tu nas ne more rešiti prav nobena tehnologija. Da bi lažje razumeli razpravo v nadaljevanju pa je morda koristno, če nekatere pojme, ki so največkrat omenjeni v tem prispevku, vsaj poskušamo obrazložiti.

1.1 Narava

Najtežje je napisati opredelitev pojma narava. Vode, gozd, gore, močvirja, morje z vso svojo vsebino in še mnogo drugega je narava. V strogem bi lahko naravo opredelili kot celoto živih in neživih pojavov, ki so nastali neodvisno od človeka.

1.2 Naravne vrednote

Pojem naravna vrednota kot tak je bil v sistem varstva narave vpeljan z Zakonom o ohranjanju narave. 4. člen omenjenega zakona določa, da naravne vrednote obsegajo vso naravno dediščino na območju Slovenije. Gre torej za redke, dragocene ali znamenite naravne pojave ali druge vredne pojave, sestavine oziroma dele žive ali nežive narave, naravno območje ali del naravnega območja, ekosistem, krajino ali oblikovano naravo. Zlasti so to geološki pojavi, minerali, fosili ter njihova nahajališča, površinski in podzemni kraški pojavi, podzemne jame, soteske in tesni ter drugi geomorfološki pojavi, ledeniki in oblike ledeniškega delovanja, izviri, slapovi, brzice, jezera, barja, potoki in reke z obrežji, morska obala, rastlinske in živalske vrste, njihovi izjemni osebki ter njihovi življenjski prostori.

1.3 Varstvo narave

Varstvo narave so dejavnosti in ukrepi za ohranjanje in razvoj naravnih dobrin od biološke raznovrstnosti rastlinskega in živalskega sveta do varovanja naravnih vrednot vključno s habitati in krajino.

1 Introduction

At the turn of the millennium, marked by changes in the social systems of transition states and integration processes, nature conservationists are once gain faced with a fundamental question: How to protect nature and its most valuable parts, and preserve them for the generations to come? The answer and the path to which it points are not easy and, on top of that, we live in an era when many values are considered less important or even irrelevant. The public often thinks that there is no such thing as nature conservation science, and consequently dismisses the solutions and activities which could result in the protection of nature or some of its parts. Are we not aware that the very existence of man is utterly dependent upon nature and its resources? No technology can solve this issue. To facilitate understanding of the issues presented in this paper, I shall begin by explaining some terms of frequent occurrence.

1.1 Nature

Writing a definition of nature is an incredibly difficult task. “Nature” is waters, forests, mountains, marshands and the sea with all their contents, and much more. It could be roughly defined as a whole made up of living and non-living phenomena which came into existence independent of man.

1.2 Valuable natural features

The term “valuable natural feature” was introduced into the nature protection system with the Nature Conservation Act. Article 4 of this Act states that valuable natural features shall include all natural heritage in the territory of the Republic of Slovenia. A valuable natural feature is therefore a rare, valuable or well-known natural phenomenon or any other valuable phenomenon, a component or part of the living and non-living nature, a nature area or a part thereof, an ecosystem, landscape or a designed landscape. The term mainly refers to geological phenomena, minerals and fossils and mineral and fossil sites, surface and subsurface karst features, caves, gorges and other geomorphological phenomena, glaciers and glacial forms, springs, waterfalls, rapids, lakes, bogs, brooks and rivers with banks, sea-shore, plant and animal species and exceptional specimens and habitats thereof.

1.3 Nature conservation

“Nature conservation” refers to all the activities and measures for the protection and development of natural assets, ranging from biological diversity of flora and fauna to protection of valuable natural features, including habitats and landscape.

1.4 Zavarovano območje

Zaradi učinkovitega varovanja, upravljanja in doseganja drugih ciljev zavarovanja lahko blizu ležeče ali funkcionalno povezane naravne znamenitosti skupaj z deli nerazglašene narave ali naravne dediščine povežemo v smiselno zaokroženo območje - zavarovano območje narave.

1.5 Narodni park

Narodni parki so predvsem večja, naravno zaokrožena, pretežno prvobitna območja z ekosistemi in naravnimi znamenitostmi kopnega in/ali morja in so izjemnega pomena za posamezno državo. Narodni parki so namenjeni za zavarovanje enega ali več ekosistemov, izločitev izkoriščanja naravnih dobrin in izločitev škodljivih posegov ter za nudenje osnovnih možnosti za znanstveno, vzgojno, izobraževalno, kulturno in rekreacijsko aktivnost obiskovalcev (Guidelines for Protected… , 2000).

1.6 IUCN - mednarodna zveza za ohranitev narave

IUCN (World Conservation Union) je Svetovna zveza za ohranitev narave. Deluje v okviru Združenih narodov. Uvrščamo jo med vladno / nevladne organizacije na svetovni ravni, saj združuje države članice, vladne agencije in nevladne organizacije. Slovenija je članica IUCN od leta 1993, Uprava RS za varstvo narave je včlanjena kot vladna agencija. IUCN je bila ustanovljena leta 1948 pod imenom International Union for Protection of Nature (IUPN), leta 1956 se je preimenovala v International Union for Conservation of Nature and Natural Resources, od zasedanja Generalne skupščine leta 1990 v Perthu (Avstralija) pa se vedno bolj uveljavlja krajši opisni naslov The World Conservation Union. Kratica IUCN se s tem ne spreminja. Posebnost organizacije je, da v svoji sestavi združuje države, državne agencije ter niz nevladnih organizacij, meddržavnih, državnih in krajevnih, v edinstveno družabništvo. Maja 1997 je IUCN štela 895 članov (74 držav članic, 105 vladnih agencij, 626 državnih nevladnih organizacij, 56 mednarodnih nevladnih organizacij in 34 pridruženih članov) iz 137 držav (Skoberne, 1997).

2 Vrednote narave kot osnovno merilo izbire za razglasitev in ustanovitev zavarovanega območja

V razmerju človeka do narave v grobem ločimo vsaj tri razvojne dobe. V davni preteklosti so bili ljudje še neobčutljivi za lepote narave. Narava, posebej divjina, je odbijala in nadvladovala človeka. Človek si je mnoge naravne pojave razlagal z mističnimi dejanji. V

1.4 Protected area

In order to ensure efficient protection, management and attainment of other nature conservation objectives, adjacent or functionally connected natural attractions and undesignated areas or areas of natural heritage can be organised into meaningful units – protected areas.

1.5 National park

A national park is a large natural area of land and/or sea, mainly in its original state, with preserved ecosystems and natural attractions, which is of great national importance. National parks are designated to protect the ecological integrity of one or more ecosystems, to exclude exploitation or occupation inimical to the purposes of designation of the area, and to provide a foundation for scientific, educational, cultural, recreational and visitor opportunities (Guidelines for Protected…., 2000).

1.6 IUCN – international world conservation union

The World Conservation Union is an organisation which was set up to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable. It operates under the auspices of the UN (UNESCO) as an organisation which brings together governments, government agencies and non-governmental organisations. Slovenia became an IUCN member in 1993, and the Agency of the Republic of Slovenia for Nature Conservation is part of IUCN as a government agency. IUCN was established in 1948 as an International Union for Protection of Nature (IUPN). In 1956 it was renamed as International Union for Conservation of Nature and Natural Resources, and since the General Asssembly meeting in Perth (Australia) in 1990, the name The World Conservation Union has been gaining in popularity. Nevertheless, the abbreviation IUCN remains the same. It is typical of the organisation that it joins governments, government agencies and a series of cross-border, national and local non-governmental organisations into a unique partnership. In May 1997, IUCN had 895 members (74 member states, 105 government agencies, 626 state non-governmental organisations, 56 international non-governmental organisations and 34 associate members) from 137 countries (Skoberne, 1997).

2 Valuable natural features as the basic selection criterion for designation and establishment of protected areas

There are at least three development stages man has gone through in his relationship to nature. In prehistoric times, people were rather insensitive to the beauties of nature. People felt in awe and controlled by nature,

novem veku, predvsem v humanizmu, se je v človeku vzbudilo še neopredeljeno zanimanje za spoznavanje narave. Tretje obdobje pa se je začelo na prelomu 18. in 19. stoletja, ko je bilo v času razsvetljenstva, romantike in prebujanja narodov vse več pozornosti namenjene naravi in pokrajini (Tuma, 1930).

S spoznavanjem narave pa so se ljudje začeli zavedati tudi ogroženosti narave oziroma je preučevanje narave predstavljalo izjemen pomen za raziskovalno delo in nova naravoslovna spoznanja. V 2. polovici 19. stoletja, ko so v Evropi popisovali naravo in pripravljali velike evidence naravnih vrednot, so se pojavile tudi pobude za zavarovanje posameznih vrst (predvsem rastlinskih). Ideja po zavarovanju nekaterih vrst je imela za vzrok na eni strani ogroženost, na drugi pa izjemnost oziroma redkost (Peterlin, 1982). Podobno kot za vrste tudi za območja velja, da sta bila vzroka za zavarovanje tako ogroženost kot tudi izjemnost. Sočasno se je v Združenih državah Amerike začelo ustanavljanje narodnih parkov. Tako je bil leta 1872 ustanovljen prvi narodni park na svetu - Yelowstone (Grazzini, 1993). Narodni parki sicer niso najstarejša oblika zavarovane narave, pred njimi so bili predvsem iz znanstvenoraziskovalnih pobud ustanovljeni naravni rezervati. Narodni parki v Severni Ameriki so bili vzgled in vzpodbuda za podobna prizadevanja drugod po svetu. Evropa jih je najbolj potrebovala in v začetku 20. stoletja tudi začela ustanavljati.

Ideja o varstvu narave in o nujnosti ohranitve njenih ogroženih delov je starejša od samega nastanka narodnih parkov, vendar je vse do prvih ustanovitev narodnih parkov ostajala v krogu razsvetljencev in daljnovidnih posameznikov. Prav narodni parki pa so idejo varstva narave na najbolj neposreden in primeren način približali širši javnosti. Zato so še danes simbol naravovarstvenih prizadevanj. Poosebljajo željo po »izgubljenemu raju«, v parke se ljudje zatekajo, da vsaj za kratek čas spet doživijo naravo v njeni prvobitnosti, ki jo sicer vsakdanje življenje vse bolj odtujuje. Namen narodnega parka je tudi omogočiti ljudem, ki prihajajo v park, uživanje naravnih in kulturnih vrednot ter rekreacijo v naravi (Peterlin, 1982).

Današnji politični, upravljavski ali iz naravoslovni raziskovalni pristopi k izbiri in ustanovitvi neke pokrajine za zavarovano območje narave so seveda različni. Podprti so z raziskavami ter vsesplošnim naravoslovnim in družboslovnim poznavanjem območja, metodologija pa se še naprej razvija. Skupni in osnovni temelj so vrednote narave, ki so in morajo biti osnovno merilo izbire za razglasitev in ustanovitev zavarovanega območja. Dejstvo je, da so bila mnoga območja v preteklosti razglašena za parke preprosto zato, ker je bila pokrajina lepa in je na pobudnike naredila izjemen vtis predvsem z estetskega vidika. Vrednote narave tako ostajajo osnovni in najpomembnejši temelj pri naravovarstveni dejavnosti povsod po svetu.

wilderness in particular. They interpreted many natural phenomena as acts of gods. In the new era, humanism in particular stirred a yet undefined interest in man to acquire knowledge of nature. The third period started at the turn of the 18th century when during the Reformation Movement, Romanticism and the Spring of Nations more and more attention was devoted to nature and landscape (Tuma, 1930).

As people came to know nature better, they soon became aware of its endangerment, and nature studies became extremely important for research work and new scientific findings. In the second half of the 19th century, when Europe started recording the nature and preparing extensive records of valuable natural features, the first initiatives for the protection of individual species (mainly plant species) were launched. On the one hand, the idea to protect certain species was spurred by the threat to these species, and on the other hand it was motivated by their outstanding value or rarity (Peterlin, 1982). Much like the species, territories were first proposed for protection for reasons of endangement and outstanding value. At the same time, the first national parks were established in the USA. In 1872 the first national park in the world, Yellowstone National Park, was proclaimed (Grazzini, 1993). Otherwise, national parks are not the earliest form of nature protection – they were preceded by nature reserves formed for scientific research purposes. National parks in North America set an example and motivation for similar initiatives in other parts of the world. Most in need of nature protection, Europe established its first national parks at the beginning of the 20th century.

The idea of nature conservation and the need for protection of its endangered parts is older than the national parks, but before the first national parks were established it had only lived among intellectuals and far-sighted individuals. But it is the national parks that have brought the idea of nature conservation closest to the general public. Even today, national parks are a symbol of nature conservation efforts. They symbolise our longing for »Eden Lost«, people regard parks as a shelter where they can for a brief moment experience nature in its indigenous form, where they can again feel the nature from which they are becoming more and more alienated. An important aim of a national park is to enable people who enter the park to experience valuable natural and cultural features and recreation in nature (Peterlin, 1982).

Current political, management or scientific-research approaches to the selection and designation of a territory as a protected area are different. They are based on research results and general knowledge of the area gathered by nature and social sciences, but the methodology is still developing. Nature protection is based on outstanding natural features which are the fundamental selection criterion in designation and establishment of protected areas. In fact, many areas used to be designated as parks primarily on the grounds of their aesthetic value. Valuable natural features therefore remain the basic and essential fundation in nature conservation worldwide.

Današnji politični, upravljavski ali znanstveno raziskovalni pristopi k izbiri in ustanovitvi neke pokrajine za zavarovano območje narave so seveda različni in metodološko še ne poenoteni. Marsikaj še ni raziskano, kljub temu, da je splošno naravoslovno in družboslovno znanje vse boljše.

3 Zavarovana območja - parki

Posebno vredni deli narave, ki jih lahko imenujemo naravne znamenitosti, naravna dediščina ali naravne vrednote, imajo (na nek način) antropogeni izvor. Človek seveda ni vplival na njihovo pojavljanje, je bil pa seveda tisti, ki je del narave označil kot posebno vreden, kot dediščino, oziroma določil tiste dele narave, ki so spoznani kot naravne vrednote. Deli narave, spoznani kot naravne vrednote, so pravzaprav le zelo majhen delež vsega naravnega okolja. Praviloma se v tisti pokrajini, kjer je naravnih vrednot največ, najprej pojavijo težnje po zavarovanem območju, težnje po ustanovitvi parka. Naravovarstvena stroka je v glavnem že prešla iz točkovnega varstva naravnih vrednot na celostno varovanje narave v obliki zavarovanih območij oziroma v obliki varstva habitatov. Prav v celostnem varovanju je največji pomen zavarovanih območij za varstvo narave. Točkovno varstvo ali ozko varstvo lokalitete naravne vrednote ni zagotovilo za učinkovito varovanje narave, predvsem je težko preprečevati posredne vplive okolja (Šolar, 2000).

Po vsem svetu so uveljavljene različne oblike zavarovanih območij, poimenovanje pa ni enotno. Najbolj razširjene oblike in imena so naravni rezervat, gozdni rezervat, naravni spomenik, narodni spomenik, narodni park, naravni park, regijski park, krajinski park, zavarovana pokrajina in območje divjine. Glede na naravovarstveni in nacionalni pomen so narodni parki tista oblika zavarovanega območja, kjer je ohranjanje in varstvo narave na najbolj neposreden način približano javnosti.

3.1 Vloga narodnih parkov z vidika mednarodnih kriterijev za varstvo narave

Narodni parki pomenijo že sami po sebi dovolj visoko raven zavarovanja s poudarjeno nacionalno vrednoto. Vrednota narodnega parka je v splošnem v zavesti ljudi zelo cenjena, drugače pa je med upravljavci in prebivalci oziroma lastniki zemljišč v narodnem parku. Pri upravljanju narodnih parkov gre pravzaprav le za dve možni poti. V prvem primeru gre za pošteno naravovarstveno in parkovno usmeritev, ki trdno in odločno vztraja na uveljavljanju upravljavskih ciljev, ki edini zagotavljajo varstvo, ohranitev in sonaravni razvoj v skladu s cilji zavarovanja in upravljanja. Druga pot pa je le navidezno varstvo, kjer se za tablo in napisom narodni park skrivajo vse mogoče aktivnosti, narodni park pa v takih primerih pomeni le kuliso za nekatere druge cilje oziroma dovoljuje kompromise do take

There are many differences in the present day political, management or scientific-research approaches to the selection and designation of a territory as a protected area, and the methodology is not yet harmonised. Many issues still remain unsolved and unreserached although the general knowledge of nature sciences and social sciences is constantly improving.

3 Protected areas - parks

Parts of nature bearing outstanding value, which can be called natural attractions, natural heritage or valuable natural features are (in a way) anthropogenic in origin. Man might not have caused their occurrence, but he designated a part of nature as carrying outstanding value, as heritage, and classified the parts of nature that are designated as outstanding natural values. These are, in fact, a very tiny part of all natural environment. As a rule, proposals for designation of an area as protected area are first launched in areas with a high number of natural attractions. Nature conservation science has come from point protection of valuable natural features to integrated nature conservation of protected areas or habitat reserves. Nature conservancy considers integrated conservation to be the most important purpose of protected areas. Point protection or narrow locality protection of a valuable natural feature does not ensure efficient nature conservation, as indirect influences of the environemnt are particularly hard to prevent (Šolar, 2000).

Various forms of protected areas are in place worldwide, but their national names vary. The following are of most frequent occurrence: nature reserve, forest reserve, natural monument, national monument, national park, natural park, regional park, landscape park, protected landscape and wilderness area. In terms of national importance and nature science importance, national parks are the type of protected area where nature conservation and protection comes closest to the general public.

3.1 Role of national parks in view of international nature conservation criteria

National parks are associated with a relatively high level of protection with expressed national values. In general, national parks are highly valued by people, but this opinion is not necessarily shared by the managers, inhabitants of land owners in the national park. Management of national parks allows only two options. The first option is an honest nature conservation orientation that firmly and persistenly pursues the park's management objectives and thus ensures protection, conservation and sustainable development in accordance with conservation and management objectives. The second option is superficial protection which uses the name and the sign of a national park as a cover for various activities and leaves the park to be nothing more than a beautiful facade for other objectives or compromises up to the point that neglects proper management objectives of a

mere, da so pravi parkovni upravljavski cilji povsem v ozadju. Res je, da so cilji upravljanja v narodnih parkih lahko specifični glede na različne fizično geografske in biotske danosti, glede na lastništvo in interese, vendar nek skupen imenovalec mora obstajati. Upravljavske kategorije IUCN za zavarovana območja in njihove definicije so prav gotovo lahko tisto merilo za upravljanje parkov, ki zagotavljajo uresničevanje naravovarstvenih parkovnih ciljev, do neke mere pa tudi primerljivost med zavarovanimi območji.

Celostno varovanje narave v okviru zavarovanih območij je edino resnično zagotovilo za ohranitev naravnih vrednot in ekosistemov. Tako varovanje lahko dosežemo samo na osnovi jasno določenih ciljev upravljanja, varstva najbolj vrednih delov narave. IUCN je pravzaprav edina organizacija za varstvo narave in posledično tudi za zavarovana območja, ki je vzpostavila sistem kategorij za uresničevanje varstva.

Cilj kategorizacije zavarovanih območij je:

- opozoriti vlade posameznih držav na pomen zavarovanih območij,
- spodbuditi vlade, da razvijejo sistem zavarovanih območij s cilji upravljanja, ki upoštevajo državne in lokalne razmere,
- zmanjšati nesporazume in zmedo, ki je nastala zaradi uporabe več različnih poimenovanj za različne oblike zavarovanih območij,
- določiti mednarodne standarde, ki bodo spodbujali globalne in lokalne koristi in olajšali meddržavne primerjave,
- določiti okvir za zbiranje, obdelovanje in posredovanje podatkov o zavarovanih območjih in
- na splošno izboljšati komunikacije in razumevanje med vsemi, ki se ukvarjajo z varstvom narave (Guidelines for Protected… , 2000).

3.2 IUCN upravljavske kategorije za zavarovana območja

Med najbolj pomembne naloge WCPA spada delo na upravljavskih kategorijah zavarovanih območij ter njihovih ciljev in namenov. Sistem kategorizacije je doživel široko uporabo. Nekatere države so ga vključile v svojo zakonodajo, uporablja se za primerjave, razprave in uveljavljanje kriterijev upravljanja in varstva v zavarovanih območjih po vsem svetu. Smernice za upravljavske kategorije ter njihove interpretacije za posamezna večja geografska območja (npr. za Evropo ali evropski alpski prostor) so vsekakor tisto vodilo, ki na učinkovit način pomaga uresničevati najpomembnejše cilje.

Glavni cilji zavarovanih območij (Guidelines for Protected… , 2000) so naslednji:

national park. Management objectives in national parks may be park-specific to comply, as much as possible, with physical, geographic and biotic facts, ownership structure and interests of stakeholders, but there must always be a common denominator. IUCN management categories for protected areas and their definitions can surely become the measurement tool that could ensure, if used in park management, implementation of nature conservation objectives and, to a certain extent, the benchmarking of protected areas.

Integrated nature conservation within protected areas is therefore the only guarantee for the conservation of valuable natural features. It can only be achieved through clear management objectives and protection of the most valuable parts of nature. IUCN is the only nature conservation organisation and the only organisation for protected areas which has so far established a functional categorisation system of protected areas.

The purpose of protected area categorisation is:

- to alert governments to the importance of protected areas,
- to encourage governments to develop systems of protected areas with management aims tailored to national and local circumstances,
- to reduce the misunderstanding and confusion which has arisen from the adoption of many different terms to describe different kinds of protected areas,
- to provide international standards to help global and regional accounting and comparisons between countries,
- to provide a framework for the collection, handling and dissemination of data on protected areas, and
- generally to improve communication and understanding among all those engaged in conservation (Guidelines for Protected Area Management Categories, 2000).

3.2 IUCN protected area management categories

Development and work on protected area management categories, their objectives and purposes is one of the main tasks of WCPA. The system of categories has been widely used. It has been incorporated in some national legislation, it is being used in comparisons, discussions and enforcement of management and protection criteria in protected areas worldwide. The guidelines for management categories and their interpretation for certain large geographic areas (e.g. Europe or European alpine world) are the lever which helps us effectively achieve our most important goals.

The following are the main purposes of management (Guidelines for Protected …, 2000):

- znanstveno raziskovanje,
- varstvo narave,
- ohranitev vrst in genetske raznovrstnosti,
- ohranitev okoljskih funkcij,
- varstvo naravnih in kulturnih znamenitosti,
- turizem in rekreacija,
- vzgoja in izobraževanje,
- trajnostna raba virov v naravnih ekosistemih in
- vzdrževanje kulturnih in tradicionalnih prvin.

Ob upoštevanju različnosti ciljev in prednostnih nalog, ki so v ospredju posameznih ciljev upravljanja, pridemo do naslednjih jasnih kategorij zavarovanih območij (Guidelines for Protected… , 2000):

I. strogo varstvo (Strogi naravni rezervat / Naravno območje),
II. varstvo ekosistemov in rekreacija (Narodni park),
III. ohranjanje naravnih pojavov (Naravni spomenik),
IV. ohranjanje z rabo (Območje zavarovanih habitatov in vrst),
V. ohranjanje krajine in rekreacija (Zavarovana krajina),
VI. trajnostna raba naravnih ekosistemov (Zavarovano območje naravnih virov).

Na osnovi te analize je IUCN razvila mednarodni sistem kategorij za zavarovana območja. Pomembne so predvsem njegove naslednje značilnosti:

- temelj kategorizacije je prednostni cilj zavarovanja (upravljanja),
- kategorizacija ne pove ničesar o učinkovitosti upravljanja,
- sistem kategorij je mednaroden,
- imena kategorij se na državni ravni lahko razlikujejo,
- vse kategorije so enako pomembne, vendar izražajo naraščanje človekovega vpliva (Guidelines for Protected… , 2000).

Posebej zanimivo je poimenovanje zavarovanih območij na državnih ravneh. V idealnem svetu bi najprej obstajal IUCN sistem kategorij in državni sistemi bi mu nato sledili, uporabljajoč standardno terminologijo. V praksi pa so seveda mnoge države ustanovile svoje sisteme in v njih uporabljale zelo različno terminologijo. Lep primer tega je narodni park, ki ga različne države različno razumejo. Mnogo narodnih parkov, ki so jih imenovale države same, ne ustreza kriterijem, ki veljajo za II. kategorijo IUCN - narodni park . V Evropi veliko zmede povzroča dejstvo, da mnogo držav v svoji zakonodaji uporablja izraze kot so narodni park in narodni rezervat za zavarovana območja, katerih cilji se prav tako razlikujejo od kategorij z istim imenom. V Veliki Britaniji, na primer, narodni parki vključujejo naselja in ekstenzivno rabo virov, zaradi česar spadajo v V. kategorijo.

4. Izločanje območij (coniranje) in načrt upravljanja

Načrtovanje in urejanje rekreacije v zavarovanih območjih lahko ustrezno izvajamo le na osnovi premišljenega strokovnega pristopa in z instrumenti prostorskega načrtovanja. Na ta način lahko v prostoru izločimo območja (cone) urejanja in upravljanja, v katerih so mesto, način in oblika rekreacije natančno opredeljeni.

- scientific research,
- wilderness protection,
- preservation of species and genetic diversity,
- maintenance of environmental services,
- protection of specific natural and cultural features,
- tourism and recreation,
- education,
- sustainable use of resources from natural ecosystems, and
- maintenance of cultural and traditional attributes.

Having regard to the different mix and priorities accorded to these main management objectives, the following emerge clearly as distinct categories of protected areas (Guidelines for Protected …, 2000):

I. strict protection (i.e. Strict Nature Reserve / Wilderness area),
II. Ecosystem conservation and recreation (i.e. National Park),
III. Conservation of natural features (i.e. Natural Monument),
IV. Conservation through active management (i.e. Habitat / Species Management area),
V. Landscape conservation and recreation (i.e. Protected Landscape),
VI. sustainable use of natural ecosystems (i.e. Managed Resource Protected Area).

This analysis is the foundation upon which the international system for categorising protected areas was developed by IUCN. There are several important features to note:

- the basis of categorisation is by primary conservation (management) objective,
- assignment to a category is not a commentary on management effectiveness,
- the categories system is international,
- national names for protected areas may vary,
- all categories are equally important, but they imply a gradation of human intervention (Guidelines for Protected … , 2000).

National names for protected areas are an issue of special interest. In a perfect world, IUCN's system of categories would have been in place first, and national systems would have followed on, using standard terminology. In practice, of course, different countries have set up national systems using widely varying terminology. To take one example, "national parks" mean quite different things in different countries. Many nationally-designated "national parks" do not strictly meet the criteria set by Category II – national park. Much confusion arises in Europe from the fact that many countries use terms such as "national parks" and "nature reserves" in their national legislation for protected areas whose objectives differ from the Categories with such names. In the United Kingdom, for example, "National Parks" contain human settlement and extensive resource use, and are properly assigned to Category V.

4. Zoning and management plans

Planning and regulation of recreation in protected areas can only be properly implemented on the basis of a thoughtful professional approach and with instruments for town and country planning. In this way, we can select areas (zones) of regulation and management where the

Določitev dejanskih izvajanj, ki naj bi zagotovila ustrezno in zaželeno rabo ter varstvo obenem, lahko omogoči le coniranje. Zaradi smiselne funkcionalne členitve prostora lahko ta prostor s coniranjem primerno uporabljamo in razvijamo. Z opredelitvijo posebej ustreznih površin za rekreacijo v odprtem prostoru se lahko varujejo in rekreacijsko razvijajo tiste pokrajine, ki so za to najbolj primerne. Opredeljevanje ustreznosti območij samo zase še ne razrešuje konfliktov oziroma konkurenčnih odnosov v prostoru, omogoča pa strokovno podprto odločanje o prioritetah.

Koncept coniranja lahko uresničujemo le, če imamo možnost ukrepanja. Glavne skupine ukrepov so administrativni ukrepi (zakoni, odloki...), ekonomski ukrepi (olajšave, stimulacije in nadomestila), socialno - pedagoški ukrepi (usmerjanje obiska) in strokovna priprava podlag za urejanje različnih dejavnosti. V sklop strokovnih podlag sodijo vrednotenje pokrajine, analiza stanja ter vplivov na naravo, določanje zmogljivosti območja za posamezne dejavnosti (tehnična in ekološka zmogljivost) in ne nazadnje ugotavljanje občutljivosti območij, ki mora biti upoštevano že v najbolj zgodnjih fazah odločanja (Jeršič, 1996).

Iz literature in praktičnih primerov je poznanih veliko različnih priporočil in pristopov za coniranje. Enotnih zasnov ni. Zato v nadaljevanju kot primer navajamo samo enega od možnih pristopov.

Na tej osnovi lahko prostor členimo na tri cone po naslednjih principih:

Cona I: Območje prometne dostopnosti, gostitev in zahtevnejše informacijske infrastrukture.
Cona II: Območje zmerne dopustne dejavnosti brez večjih infrastrukturnih posegov.
Cona III: Območje miru, namenjeno prvenstveno varstvu narave (Buchwaldt in Engelhardt, 1973).

Jasen in kompleksen načrt upravljanja je bistven instrument za opredelitev problemov, določitev prioritet in zagotovitev sodelovanja možnih partnerjev. Načrtovanje in urejanje prostora v zavarovanem območju se mora smiselno prostorsko povezovati z okoliškimi območji in se ne sme ustaviti na administrativni meji zavarovanega območja. Upravljavec zavarovanega območja mora biti pri svojem načrtovanju odprt in usmerjen k integralnemu pristopu. Kot je bilo že omenjeno, je nujno sodelovanje z lokalnimi skupnostmi in tudi vsemi drugimi organizacijami in posamezniki, ki imajo interes v prostoru. Treba je dobro analizirati stanje in prisluhniti različnim interesom, pri čemer je treba vedeti, da vsi interesi v zavarovanem območju ne morejo biti uresničeni.

Namen načrtovanja v zavarovanem območju je dolgoročno prispevati k doseganju ciljev ohranjanja in varstva narave. Z izobraževanjem, komuniciranjem in informiranjem javnosti so dane možnosti za zagotovitev podpore za zavarovano območje in za naravovarstvene interese nasploh. Načrt upravljanja je interdisciplinarni in dinamični proces, kjer je posebej

location, method and form of recreation are all strictly defined.

The activites which should be performed in order to ensure appropriate and desired use and protection of an area can only be defined through zoning. Providing for a clear functional division of an area, zoning contributes to its appropriate use and development. The selection of areas which are particularly suitable for recreation in the open countryside secures the protection and further development of the areas of highest suitability. Although assessment of area suitability may not solve conflicts or competitive relations within this area, it guarantees that the setting of priorities is scientifically based.

The implementation of the concept of zoning is conditioned by the authority to act. The main groups of measures to be applied are administrative measures (laws, ordinances, …), economic measures (deductions, incentives and compensations), social and pedagogical measures (visit management) and preparation of professional groundwork on the regulation of different activities. The required expert groundwork includes landscape evaluation, analysis of the situation, impact assessment, area carrying capacity assessment by activity (technical and ecological capacity) and, last but not least, area sensitivity assessment that must be observed in the earliest phases of decision-making (Jeršič, 1996).

There area many different recommendations and approaches to zoning, available in literature and evident from practice. There are, however, no unified designs. In the continuation of this paper I shall therefore try to present a model zoning approach.

According to this zoning approach, an area can be divided into three zones:

Zone I: Area of traffic accessibility, population and infrastructure densities, advanced information infrastructure.
Zone II: Area of moderate activity without any severe infrastructure interventions.
Zone III: Area of peace, intended primarily for the protection of nature (Buchwaldt and Engelhardt, 1973).

A clear and complex management plan is therefore an essential document in which we define problems, set priorities and secure cooperation from potential partners. Planning and spatial regulation in a protected area must be connected in terms of content with the neighbouring areas and may not stop at the administrative borders of a protected area. When planning its activities, a protected area management authority shall remain open-minded and oriented towards an integrated approach. Cooperation with local communities and other stakeholders is of utmost importance. The current situation in the area needs to be analysed and different interests considered. Nevertheless, it should also be noted that all interests in a protected area can never be served.

The purpose of planning in a protected area is to make a long-term contribution to the attainment of objectives of nature protection and conservation. Education,

potrebno upoštevati zahteve in pravila prostorskega planiranja ter gospodarskih dejavnosti kot so turizem, kmetijstvo, gozdarstvo in vodno gospodarstvo. Ne sme se pozabiti na komunikacijsko omrežje (promet) in komunalno infrastrukturo. Zelo pomembni pa so tudi stiki z javnostjo, informiranje in okoljska vzgoja. Načrtovalci morajo biti posebej pripravljeni na okoljske, socialne in ekonomske dejavnike. Ustrezne odločitve zaradi sprememb so možne le na osnovi poznavanja stanja, zato so raziskave in monitoring nujno potrebni sestavni del načrtovanja ter upravljanja v zavarovanih območjih.

5. Sklepne ugotovitve

Pri določanju in uresničevanju varstvenih ter upravljavskih ciljev za varovanje naravnih vrednot oziroma zavarovanih območij se srečujemo z različnimi interpretacijami in odpori do uveljavljanja teh ciljev. Instrument upravljavskih kategorij IUCN s svojimi smernicami in standardi je bil do nedavnega premalo uveljavljen in slabo razumljen. Upoštevanje teh mednarodnih norm je na nek način uzakonil šele Zakon o ohranjanju narave (1999).

Predstavljen način razmišljanja o varovanju naravnih vrednot v luči upravljavskih kategorij IUCN za zavarovana območja ter nekateri preizkusi teh načel pri dejanskem načrtovanju v parkih so se izkazali za dovolj jasne, učinkovite in realno izvedljive strokovne podlage. To pa daje zagotovilo in optimizem za uresničevanje osnovnega naravovarstvenega poslanstva: ohraniti tisto, kar smo podedovali od naših dedov in si sposodili od naših otrok.

communication and information of the public provide ample opportunities for ensuring support for protected areas and for nature conservation interests in general. A management plan is an interdisciplinary and dynamic process which demands observation of the requirements and rules of spatial planning and economic activities such as tourism, agriculture, forestry and water management. We must, however, not neglect the communication network (transport) and public utility infrastructure. Other areas of importance are public relations, public information service and environmental education. The planners shall be equipped to deal with environmental, social and economic factors. A profound knowledge of the situation is required if the decisions taken bacause of certain changes are to be appropriate, which is why research and monitoring are essential components of planning and management in protected areas.

5. Conclusions

In the process of setting and implementation of protection and management objectives regarding the protection of valuable natural features we are often faced with different interpretations and adverse reactions. Until recently, IUCN Management Categories with their guidelines and standards were under-implemented and poorly understood. In a way, compliance with the international standards only became required by law as the Nature Conservation Act (1999) was passed.

The proposed model on the protection of valuable natural features according to the IUCN Protected Area Management Categories has, along with certain tests of these principles in actual planning in parks, proved to be a sufficiently clear, effective and feasible expert groundwork. Now, we can rest assured and feel very optimistic that we shall successfully carry out the fundamental nature conservation aim: to preserve what we have inherited from our grandfathers and borrowed from our grandchildren.

Metod ROGELJ, Nataša GORJANC

BARJA V ČEMŠENIŠKIH GMAJNAH - PROBLEMATIKA NJIHOVEGA VARSTVA

Bogs in Čemšeniške gmajne - problem connected with their protection status

Barja so se razvila v večjem gozdnem kompleksu Čemšeniških in Prevojskih gmajn med Domžalami, Radomljami in Lukovico v povirju potoka Želodnik. Večino gozdnega kompleksa predstavlja kisloljubni gozd borovnice in rdečega bora (Myrtillo - Pinetum austroalpinum, Tomažič 1942). V posameznih dolinicah, kamor se na neprepustnih glinastih tleh steka deževnica, so na nekaj mestih nastala manjša barja. Sodeč po mešanju minerotrofnih in ombrotrofnih vrst gre za prehodna barja.

Zavod RS za varstvo narave, Območna enota Kranj je kmalu po odkritju prehodnih barij na podlagi Zakona o naravni in kulturni dediščini predlagal Občini Domžale zavarovanje barij s celotnim vplivnim območjem Čemšeniških in Prevojskih gmajn za naravni spomenik. Postopek zavarovanja je bil izpeljan, vendar je moralo Ministrstvo za kulturo zaradi administrativnih napak odlok o zavarovanju razveljaviti. Pri ponovnem poskusu zavarovanja barja zaradi nasprotovanja lastnikov zemljišč odlok o zavarovanju ni bil sprejet.

Pri kasnejših spremembah in dopolnitvah prostorskega plana občine Domžale je občina na pobudo posameznikov, kljub nasprotovanju ZRSVN OE Kranj, v prostorskem planu opredelila stanovanjsko območje neposredno v vplivnem območju barij. Hkrati se je izkazalo, da je prostorski plan Občine Domžale še iz preteklosti na območju Čemšeniških in Prevojskih gmajn "podedoval" lokacijo za deponijo komunalnih odpadkov, obrtno cono in vodni zadrževalnik. Na podlagi opozoril Zavoda in osveščene lokalne javnosti ter v pričakovanju podzakonskih aktov, ki bi omogočili zavarovanje po Zakonu o ohranjanju narave, je občina v letu 2001 pristopila k pripravi izhodišč za zavarovanje območja kot krajinski park. V letu 2002 je z namenom ureditve neustreznih prostorskih razmer pričela z izdelavo Krajinskih zasnov.

Na žalost ali na srečo je največja pridobitev vsega dogajanja v zvezi z barji visoka osveščenost lokalnih prebivalcev, ki se zavedajo pomena prehodnih barij v Čemšeniških gmajnah in zato pozorno spremljajo dogajanja v zvezi z njimi.

Represented bogs were developed through times in larger forest complexs of so caled Češeniške and Prevojske gmajne, located betwen Domžale, Radomlje and Lukovica around basin of stream Želodnik. Most of the forest complex is structured of accid loving plants red pine and bilberry in association Myrtillo - Pinetum austroalpinum. Clay ground structure cought the rain in seperate little valleies where smaller bogs were formed. Mix of minerotrophic and ombrotrophic species indicate on transitional bog.

The Institute for Nature Conservation in Kranj (ZRSVN, OE Kranj) has suggested community Domžale to conserve the bogs and surraunding area of Češeniške and Prevojske gmajne as a natural monument accordning to the low, as soon as they have been descovered. The proces of conservation was made, but had to be abbolited by the Ministry of culture, because of administration errors. At the next procces of conservation, a conservation act was not accepted because of contradiction of land owners.

Community Domžale latter declared residential area in the bog even opposition of the ZRSVN, OE Kranj. At the same time it prowed that community Domažale also planed to built a rubbish dump, industrial area and a watter dwelling in this area.

On the basis of ZRSVN's warnins the community of Domžale in the year of 2001 prepaired some new basis for conservation of this area as a landscape area. No serious progress has been done by now in the sense of active conservation of this area. We are still waiting for new laws and count on intense consciousness of local residents to strongly support us in our efforts to conserve this area.

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Pimož SIMONČIČ, Lado KUTNAR

PREHRANSKE RAZMERE ZA RUŠJE (Pinus mugo Turr.) IN SMREKO Picea abies (L.) Karst.) KOT BIOINDIKATORJA RASTIŠČNIH RAZMER NA POKLJUŠKIH BARJIH

Nutrition status of Pinus mugo Turr. and Picea abies Karst. as bioindicator of site conditions on the Pokljuka mires

Na poklјuških barjih smo vzorčili iglice rušja (Pinus mugo) in smreke (Picea abies). Raziskovalne ploskve so bile locirane na različnih barjih (od ombro-oligotrofnih do mezotrofnih razmer). V iglicah rušja in smreke smo analizirali vsebnost esencialnih hranil (dušik, fosfor, kalij, kalcij, magnezij, žveplo in ogljik). Analiza je potrdila pričakovane razlike v prehranskem statusu izbranih vrst. Vsebnost mineralnih hranil dobro nakazuje razlike med slabšimi in boljšimi rastiščnimi razmerami, zato je ustrezen indikator stresnih razmer (npr. počasna mineralizacija, visoka vsebnost vode v tleh, temperaturne skrajnosti). Na barjih je vsebnost kalcija v iglicah rušja višja kot na ostalih rastiščih.

At the Pokljuka plateau mires needles samples of Pinus mugo and Picea abies were collected. Research plots were situated in the mires at the ombro-oligothrophic to mesothrophic conditions as well. The contents of essential nutrients (nitrogen, phosphorous, potassium, calcium, magnesium, sulphur and carbon) were analysed. Expected differences between pinus and spruce mineral status for all analysed nutrients were confirmed. Contents of mineral nutrition indicate well poor vs. rich site conditions and are appropriate indicator for stress conditions (slow mineralisation, high soil water content, temperature extremes). In mires in comparison to other sites, contents of Ca in mountain pine needles are higher.

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Mihej URBANIČIČ, Lado KUTNAR

TALNE RAZMERE POKLUŠKIH BARIJ

Soil conditions of the Pokljuka mires

Na šestih barjih poklјuške planote in na njihovih robovih smo sistematično osnovali 42 ploskev (po sedem v šestih vrstah, vel. 2 x 4 m). Na njihovih ogliščih smo ugotavljali tipe tal po slovenski razvrstitvi ter talne enote po mednarodni (FAO-Unesco 1989, WRB 1998) klasifikaciji tal. Na 168 vzorčenih izvrtkih smo ugotovili sedem različnih tipov tal (rendzine, evrična in distrična rjava tla, rjava podzolasta tla, podzole, oglejena tla ter šotna tla) in 28 njihovih nižjih pedosistematskih enot. Na skoraj četrtini od skupno 42 ploskev smo našli po dve do tri različne talne enote na ploskev. Na dobri polovici ploskev smo ugotovili po dve, tri ali celo štiri različne nižje pedosistemaske enote. Preiskana šotna tla visokih barij in podzoli na njihovih robovih so tako redke in ogrožene oblike tal pri nas, da jih je potrebno uvrstiti in zavarovati kot naravno dediščino.

On the Pokljuka plateau 42 (six series of seven, 2 x 4 m) plots were placed systematically over six mires and their edges. On the corners of all research plots we determined the soil types according to Slovenian classification and soil units according to international (FAO-Unesco 1989, WRB 1998) soil classification. On 168 sampling spots seven different soil types (rendzinas, eutric and dystric brown soils, brunipodzols, podzols, peat soils) and their 28 lower pedosystematic units were found. On almost one quarter of the 42 plots we found two or even three different soil units per plot. On more than half of the plots we found two, three or even four different lower pedosystematic units. Examined peat soils of mires and podzols on their edges are so rare and so threatened soil forms that is necessary to be classified and protected as our natural heritage.

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Tanja MENEGALIJA

PREDLOG ZA RAMSARSKO LOKALITETO V TRIGLAVSKEM NARODNEM PARKU – ZALEDJE BOHINJSKEGA JEZERA

Proposed Ramsar site in the Triglav national park - The cathcment of Bohinj lake

Februarja 1971 je bila v iranskem mestu Ramsar podpisana konvencija o mokriščih, ki imajo mednarodni pomen, zlasti kot prebivališča močvirskih ptic. Konvencija predstavlja medvladni sporazum, ki zagotavlja mednarodno sodelovanje pri ohranjanju mokrišč, njihovih funkcij in biotske raznovrstnosti. Države podpisnice so se zavezale, da bodo :

- uvrščale mokrišča na Seznam mokrišč mednarodnega pomena in ohranjala ter vzdrževala njihovo ekološko ravnovesje
- vključevala ohranitev mokrišč v nacionalne razvojne programe in načrtovale celostno upravljanje povodij ob spoštovanju načela trajnostne rabe
- podpirale razvojno politiko ohranjanja mokrišč na svojem ozemlju z razglašanjem zavarovanih območij in podpirale strokovno usposabljanje raziskovalcev in upravljalcev mokrišč
- sodelovale z drugimi pogodbenicami na področju mejnih mokrišč in hidroloških sistemov in v skupnih razvojnih projektih na mokriščih.

Predlagano območje leži v Triglavskem narodnem parku in pokriva 11 000 ha. To alpsko mokrišče obsega alpske travnike, izvire jezera in močvirja.

In February 1971, the Convention on Wetlands of International Importance was signed in Ramsar, Iran. These wetlands are of particular importance as habitats of waterfowl. The convention is an inter-governmental treaty which guarantees international co-operation in the preservation of wetlands, their functions and biodiversity. Parties joining the Ramsar Convention undertake to:

- designate wetlands for inclusion in the List of Wetlands of International Importance and preserve and maintain their ecological balance,
- include wetland conservation considerations in their national plans of development and promote the wise use of wetlands,
- promote the development policy of wetland preservation by establishing nature reserves in wetlands and promote training in the fields of wetland research, management and wardening,
- consult with other contracting parties with regard to cross-border wetlands, shared water systems and joint development projects in wetlands.

Proposed Ramsar site lies in Triglav national park and covers 11 000 ha. This alpine wetland include alpine meadows, temporary waters from snow melt, alpine freshwater sources, alpine lakes and marshes.

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