



Man, Nature and Environment between the Northern Adriatic and the Eastern Alps in Premodern Times



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Zbirka zgodovinskega časopisa

**Man, Nature and Environment
Between the Northern Adriatic
and the Eastern Alps
in Premodern Times**

Edited by
Peter Štih and Žiga Zwitter

Ljubljana 2014

Peter Štih, Žiga Zwitter (editors)

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Zbirka Zgodovinskega časopisa 48

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Verena Winiwarter

The Emerging Long-Term View: Challenges and Opportunities of Writing Environmental Histories in Central Europe*

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The Emerging Long-Term View: Challenges and Opportunities of Writing Environmental Histories in Central Europe

The changing earth and the people trying to shape it are a complex system. It will never be fully understood and certainly not become predictable. A concept from environmental history, the risk spiral, illustrates that risk management, successful at first sight, often involves new, unknown risks. These become apparent only in a long-term view. Using the Danube River Basin as an example, the paper not only shows the conceptual challenges but also the opportunities which a long-term view presents for environmental historians who want to contribute to the sustainable development of Central Europe.

Key words: Long-Term-Socio-Ecological Research, Sustainable Development, Environmental History, Danube, Interdisciplinarity, Socio-Natural Sites

Author's Abstract

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Nastajajoč dolgoročni pogled: Izzivi in priložnosti pisanja okoljskih zgodovin v Srednji Evropi

Spreminjajoča se zemlja in ljudje, ki jo skušajo oblikovati, predstavljajo kompleksen sistem, ki ga ne bo nikoli mogoče povsem razumeti, še manj pa napovedati njegovo prihodnost. Spirala tveganja, koncept okoljske zgodovine, ilustrira, da obvladovanje tveganja, ki se na prvi pogled zdi uspešno, pogosto vključuje nova, neznana tveganja. Ta postanejo očitna šele, če nanje pogledamo z dolgoročne perspektive. Na primeru porečja Donave prispevek ne prikazuje le konceptualnih izzivov, ampak tudi priložnosti, ki jih dolgoročna perspektiva ponuja okoljskim zgodovinarjem, ki raziskovalno prispevajo k trajnostnemu razvoju Srednje Evrope.

Ključne besede: dolgoročno družbeno-ekološko raziskovanje, trajnostni razvoj, okoljska zgodovina, Donava, interdisciplinarnost, družbeno-naravna prizorišča

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A long-term view as tool to deal with uncertainty¹

The changing earth and the people trying to shape it are a complex system. It will never be fully understood and certainly not become predictable. The Austrian cybernetics expert Heinz von Foerster (1911-2002) expressed this early on using the metaphor of the “non-trivial machine” for systems that depend on their internal states for their development. These systems are indeterminate.² Understanding people and societies is not possible according to the laws of mechanics, as tempting as this may be at a time of fervent search for predicting the future development of societies under conditions of global environmental change. Because of the difficulty in modelling society and people, lessons from the past are a necessary part of our attempts to find a guide to a sustainable future.

From his knowledge of complexity, von Foerster formulated an ethical imperative for humans asking them to act always so as to increase the number of choices. But how do we know *a priori* which of our actions will increase the number of possibilities – especially if we accept that the behaviour of people and the earth is not predictable? It would be a big step towards acceptable quality of life for all, if we could at least learn to avoid those actions by which we definitely limit our future choices.³

The way of thinking we are familiar with – simple cause-effect relationships – quickly approaches its limits. Thresholds, beyond which a system reaches a new state that is not a linear evolution of the old state, surprise us. It is often difficult to include the concept of feedback into our ideas of nature and people. But such feedbacks are abundant and side-effects are very common. Complex systems are changing due to many factors, which act simultaneously and mutually influence each other, in many unpredictable ways. Side effects can be serious and make it difficult to act with the aim of increased choices, even if humans are insightful and confident.

¹ This paper is based on Winiwarter et al., *The Environmental History of the Danube River Basin*, on Brumat, Frausin, *DIAnet International School*, on Winiwarter, Bork, *Geschichte unserer Umwelt*, introduction, on an unpublished manuscript for a presentation at the RCC lunchtime colloquium in Munich. References to the three publications are too widespread to be given in detail.

² von Foerster, *Über das Konstruieren*.

³ id., *Kybernetik*, p. 153ff.

If the environmental historian Rolf Peter Sieferle and the chemist Ulrich Müller-Herold are right, we are in a “risk spiral”, which cannot easily be eliminated. Any intervention into natural systems will lead to unintended effects in addition to the desired or at least foreseen consequences. Human history is full of these spirals.⁴ How does the risk spiral work? Some examples will help to make the logic clear. Humans stored grain early on against the risk of fluctuating crop yields. The stocks kept in granaries transformed mice, rats and insects into storage pests, for which stored food is welcome fodder – a new risk had emerged. Another example is irrigation. In dry areas with fertile soil, irrigation seemed to solve the problem of water limitation for agriculture. Early in the history of the ancient civilizations of Mesopotamia, centrally organized groups of humans built elaborate irrigation systems. These systems had an important side effect, which only became apparent over the longer term. River water, which was distributed on fields, contains much more dissolved salts than rainwater. If the irrigated soils were not flushed regularly, more and more salt deposited and the earth became barren. This is what happened. To date, due to these interventions many millennia ago, the soils of Mesopotamia are much less fertile than they once were. This effect has been known for almost 50 years.⁵ The draining of the Dutch peat bogs undertaken around 1000 C.E. for reclamation of fertile land had side effects with which the country is fighting today, to cite an example from the more recent past. As can be seen, the risk spiral illustrates that risk management, successful at first sight, often involves new, unknown risks. Only in a long-term view these become apparent.

The world since 1850 – a special era of environmental history

Today, we live in the age of globalization. Never before have raw materials, manufactured goods and people travelled to such an extent and over such distances. Never before were natural systems changed so much and been subject to such pressure.⁶

The European Environment Agency has tried to capture these pressures in the “DPSIR” concept. It describes the control loop of economic activities, natural and social systems. Economic drivers (**D**riving forces) cause environmental pollution (**P**ressures), change the state of the environment (**S**tate), which in turn acts on society and economy (**I**mpact) and leads to responses in society (**R**esponses).⁷ The model is influential and important for policy makers in Europe. Because it is based on linear cause-effect relationships, its explanatory value is nevertheless limited.

Historians shy away from explaining social facts by means of material causes, but environmental historians have pioneered the study of interactions between nature (the material) and culture without falling into the trap of environmental determini-

⁴ Sieferle, Müller-Herold, *Surplus and Survival*.

⁵ Jacobsen, Adams, *Salt and silt*.

⁶ McNeill, *Something new under the Sun*.

⁷ Kristensen, *The DPSIR framework*.

sm. If one accepts that material constraints apply to society, one material change stands out in explaining the changes of the 20th century. Only the uncontrolled and seemingly unlimited use of fossil fuels – the rapid consumption of millions of years of accumulated and decomposed biomass – allows the extreme degree of interference with the systems of the earth. The side effects are accordingly huge. But even before fossil fuels, humans intervened massively in nature on the local and regional scale. Our problems did not begin with the Industrial Revolution; neither will they end suddenly with the foreseeable end of the fossil age. A long-term view puts the 20th century in perspective. Technology based on fossil energy has enabled unprecedented - predominantly economic – growth and success. The successful fight against disease and our growing mastery in the art of finding sources of energy are undoubtedly great achievements. But unexpected feedbacks and unwanted side effects abound.

We live in an age of unprecedented human intervention into ecosystems.⁸ There are effects, which can only be assessed using the sophisticated reconstructions techniques of the palaeosciences, because they only become apparent over longer time. Such longer periods of observation are quintessential, because how the forces of the present, called the “great acceleration” by some researchers, affect specific landscapes and people alike depends on the preconditions of each site or locale, on its environmental, social and economic history, but also on the cultural history of mentalities, ideologies and often conflicting actor’s interests.

The Danube River Basin as an example for central European environmental history

The Danube River Basin (DRB) is a very complex geographical area, shared by 19 countries and 81 million people, with an extension of ca. 800.000 km². The Danube River is about 2,780 km long, up to 1.5 km wide, and up to 8 meters deep. The countries that share the territory of the Danube River Basin can have a large portion of the DRB within their borders, or just a very small percentage. Hungary lies entirely inside the DRB, and countries such as Romania, Austria and Slovakia lie largely, over 95% of their territory, inside the DRB. On the contrary, Poland and Albania are only marginally affected by what happens in the basin with 0.1% and 0.01% of their territory respectively belonging to the DRB.

Because of the possibilities of humans pointed out above, the legendary “Blue Danube” is anything but blue. The colour-ribbon visualisation of the river from its source to the delta, the blue colour denoting the “reference conditions” of the European Water Framework Directive, which should be near-natural conditions, is missing from the depiction offered by the ICPDR.⁹

⁸ For a comprehensive discussion see Williams et al., *The Anthropocene*.

⁹ ICPDR, *Overall total hydromorphological assessment*; ICPDR, *Joint Danube Survey*: nowhere does the Danube (according to data from 2007/8) exhibit reference conditions.

This is a clear sign of the unsustainable development, which is characterising the DRB at the moment, and indicates that action towards sustainable development in the region is necessary and no longer deferrable. An international effort is necessary to deal with this type of problems, which are similar to those in other parts of Central Europe.

The River is known by different names along its course. In Hungarian it is called Duna, in Romanian Dunăre, in German Donau, in Slovakian Dunajin, in Serbian Dunav (Дунав), and so forth. In the DRB, 81 million people communicate through 20 different languages, at least 17 of which are official national languages. Parts of these populations speak other languages of the Danube basin as their mother tongue. This is due to the eventful history of the area and is an important common feature of all countries of the Danube basin. It is important to realize that a communication challenge in the DRB exists, which needs to be addressed and overcome in order to allow shared decisions and policies, which are essential if we really want the DRB to enjoy a sustainable development.

Back in the early 19th century, in the wake of the Napoleonic wars, the Congress of Vienna created the Danube as an international water body, in the common interest of all living along its shores. With environmental problems abounding, the European Community in 1994 created the Danube River Protection Convention. The body entrusted with taking care of the execution of the Convention, ICPDR (International Commission for the Protection of the Danube River) was founded in 1998. It is dedicated to the following goals: Safeguarding the Danube's Water resources for future generations; achieving naturally balanced waters free from excess nutrients; eliminating risk from toxic chemicals; enabling healthy and sustainable river systems; and seeking ways to make floods damage-free. The latter is very important because many people live in flood plains. But the legacies of the past make the goals all but easy to achieve. Numerous constructions interrupt the natural flow of water and fish passage, obstacles to species movement abound. Many such obstacles are present in the upper basin. Power plants, which provide sustainable energy from hydropower, interrupt the natural flow of the river and the free movement of species as a side effect. Despite fish ladders and side-streams as worthy attempts to balance the goals of conservation and those of transport and power generation, there are no easy solutions to these problems.¹⁰ The DRB has been linked to the other major river system of Europe, the Rhine Basin via the Rhein-Main-Donau-Kanal, one of the many heavily modified and artificial water bodies in the Danube Basin.¹¹ The Rhein-Main-Donau-Kanal, which links two different river systems and consequently two ecological systems, could lead to a potentially dangerous situation for some species. The origin of some of these modified or artificial river bodies lies in the distant past. Such artificial water bodies are not necessarily a problem, but we have to realise that if we want to work for the

¹⁰ All data are available at the ICPDR website. The interruption map: ICPDR, *Danube River Basin District: Rivera and Habitat*.

¹¹ See the map: ICPDR, *Danube River Basin District: Heavily Modified and Artificial Water Bodies*.

sustainable development of the DRB, we must take into account that the course of the Danube River has been heavily modified.

While ICPDR continues to work towards its goals, representatives of the Governments of Austria, Bulgaria, the Czech Republic, Germany, Hungary, Romania, Slovakia and Slovenia on April, 25th, 2010 signed yet another international agreement, the ‘Danube Declaration’. It makes abundantly clear that the Danube Region serves as a spatially explicit centre of hopes for a better future despite any ecologically founded restrictions of its use:

“Emphasizing that the Danube Region Strategy will serve the goal of increasing prosperity, security and peace for the peoples living there, especially through enhancing cross-border, trans-regional and trans-national cooperation and coordination;

Considering the strategic policy areas of energy, environmental and nature protection, transport and infrastructure, professional training and innovation, arts and cultural activities, as well as sustainable economic activity and tourism, food security/safety, economy, SME¹² cooperation, R+D¹³, migration, governance, sport, education and culture, labour, health and social affairs as key elements of the future EU Strategy for the Danube region.”¹⁴

Placing hope on the Danube is not a new thing. Since the world fair in Paris in 1867, the Danube features as the epitome of Austrian landscapes, a river set to music by Johann Strauß in a now world-famous waltz. The lyrics speak of the valleys and water-meadows, of the Danube’s power to link countries, of the blessings it offers along its course, and mention one of the most important geographical features of the Danube, the fact that it runs eastward – being the only major river system in Europe doing so. These famous lines by Franz von Gernerth touch on several important features of the Danube and its adjacent landscapes, mention both their political and their biophysical qualities. Environmental historians are called to integrate both realms. This is conceptually challenging.

Conceptual prerequisites for interdisciplinary approaches in environmental history

In his 2006 book on ‘Austria, Hungary and the Habsburgs’, Robert Evans describes the role of rivers as [contested] borders. “River frontiers in fact generated all manner of complex disputes: over water transport and its regulation; over fords, bridges, and their maintenance; over mills, fishing and other riparian rights; over flooding, or conversely over drainage; even – the toughest problems of all – over changing locations of the bed of the stream. The ancient, and in its larger features unquestioned, Austro-Hungarian border was partially riverine, and those sections most gave rise to litigation: protracted arguments about shifting islands at the

¹² Small and medium entrepreneurs.

¹³ Research and development.

¹⁴ Ministry for Foreign Affairs of the Republic of Hungary, *Declaration of the Danube Summit*.

confluence of the Danube and the March, and elsewhere, and, further south, about the course of the little rivers Leitha and Lafnitz.”¹⁵

Seen from an environmental historian’s viewpoint, it is the nature of rivers, which makes them a source of protracted argument, rivers being dynamic at time-scales within human experience. Mountains move, but they do so at geological timescales, normally removed from human perception. Rivers, in contrast, are fast changing landscape elements, and hence, a source of disturbance for societies based on territorial rights. They are also multi-functional elements of landscapes, with many of these potential functions being in conflict with one another.

Rivers are neither cultural nor natural spaces. They are hybrids, where the interplay of humans with the environment can be studied over long periods with particular emphasis on the environmental legacies communities have had and still have to deal with. While the ice-flood in 1775 was exacerbated by islands – which might or might not be of natural origin, some islands formed around shipwrecks – many other ice-floods were created by bridges, under which the floes got stuck, piled up and created a flood.

But I would want to make a larger claim than that. The current situation of the DRB cannot be understood, and hence a sustainable future cannot be planned, if the common past of nature and humans is not known. One apparent field where long-term knowledge is crucial is flood protection. Hydraulic engineer Günter Blöschl is a pioneer in arguing for a socio-hydrological approach to floods.¹⁶ His team uses historical evidence to reconstruct long-term flood series.

Floods are well represented in a variety of sources, some even from outside the basin. Printed both in the London Evening Post and in the Virginia Gazette,¹⁷ a letter from Vác (Hungary). The town is located 35 kilometres north of Budapest on the eastern bank of the Danube river. In the newspapers dated February, 28th 1775, a detailed description of the inundation of this town is given. *‘The mildness of the weather since the 9th, melted the snow on the mountains, the waters from whence run like so many rivers into the Danube, then covered with ice, which did not break till seven o’clock on the morning of the 15th; after which the water rose so as to be perceived every moment, and very soon overflowed the roads, carrying away (besides large quantities of ice) trees, woods, mills, &c.*

The islands above this place stopt the ice, which accumulating formed mountains, and impeded the progress of the water, which nevertheless rose slowly, and only inundated some low houses, whose inhabitants had quitted them. On the 16th the ice began to fall, and the violent rising of the water was so rapid as scarce to be perceived before most of the lower town was laid under water, and the inhabitants had but just time to save themselves and children, the water having risen seven or nine feet in half an hour. By the help of 18 boats, which were brought in carts, the people were taken out of their attick stories; and some out of trees, where they had gone for refuge. The waters continued to raise more and more, and swept

¹⁵ Evans, *Austria, Hungary*, p. 122.

¹⁶ Sivapalan et al., *Sociohydrology*.

¹⁷ *Virginia Gazette*, Purdie, June 09, 1775, p. 2.

*away all the houses to the Barracks, and the great stone bridge without the town was under water; the road on the side of the Danube, and all houses were five feet under water. The Danger was then universal, and the alarm general, when happily about noon the water began to fall as fast as it had rose. About 70 houses have been carried away.*¹⁸

Tracing flood histories is one example for the challenges of writing environmental histories in Central Europe. Two quite different sets of skills are needed. One set is the historian's craft. The historian works at making sense of sources, constructing a compelling narrative from chaotic facts, tracing human appreciation of the Danube, human uses of the Danube, human interventions into the Danube such as bridges, weirs, fishtraps, shipmills and later on, power plants. The skills of the landscape ecologist, the hydrologist, the historical geographer, the geomorphologist and many other natural scientists are needed for the second building block. We need reconstructions of past riverine landscapes, ecosystems, of paleo-meanders and we need a chronology to answer questions of cause and effect – what was first, the intervention or the problem? Without knowing about the substrate of perceptions of historical actors, we cannot evaluate their perceptions for our narrative. How does the river the newspapers are talking about actually look like? Very different from how we perceive it today. Both are necessary, none is more important, both skills are of equal importance for an environmental history of the Danube River Basin.

But how can these two building blocks be integrated and what type of narrative will be compatible with current political discourse? Many concepts have been suggested but each of them has weaknesses and limits.

Richard White has coined the term “Organic Machine” in his 1996 book on the Columbia for the hybridisation of the Columbia becoming an essential part of societal infrastructures.¹⁹ Elegant, useful, but as a metaphor probably of little use when talking to politicians, it lacks a differentiation between natural and cultural realms, which is exactly what White wanted, and for good reasons, the world being best understood as hybrid. The concept of interaction between natural and cultural realms of causation as developed by Fischer-Kowalski and Weisz in 1999,²⁰ suggested to study interactions between nature and culture. It is derived from system's theory. Its limit is the lack of a clear connection to actors, a hindrance for its connection to the politics of conservation and use by people with interests, hopes, and stakes in the river.

The concept we have suggested for a variety of reasons deals with practices and arrangements in co-evolution forming socio-natural sites.²¹

Socio-natural sites are nexuses of practices and arrangements. A practice is a routinized way in which bodies are moved, objects are handled, subjects are

¹⁸ *London Evening Post* (London, England), Thursday, March 30, 1775, Issue 8271.

¹⁹ White, *The Organic Machine*.

²⁰ Fischer-Kowalski, Weisz, *Society as a hybrid*.

²¹ Winiwarter, Schmid, *Umweltgeschichte als Untersuchung* after Schatzki, *Nature and Technology*.

treated, things are described and the world is understood.²² Arrangements are the material precipitates of practices. They are maintained by continued interventions, practices of building are followed by practices of maintaining. Practices are constituted by sensual perceptions, which lead to representations of them by means of communication; these representations are interpreted and changed into programs for the intervention into arrangements, and work is needed to actually change arrangements according to the perception-and-interpretation based programs. Work, which is available through practices, is an intervention into material arrangements; it changes these arrangements, which leads to changes in practices, which in turn has an impact on where and how which work can be done. Building a bridge facilitates crossing a river, but the same bridge may become an obstacle for ship transport. Practices and arrangements are transformative to each other, if one changes, the other changes as well, and the socio-natural site transforms. Environmental history, one could therefore say, investigates the conditions and consequences of interventions into material arrangements through work. Human beings create, via their practices, arrangements from the material world to harvest exergy (= useful energy). All arrangements deteriorate due to wear and tear. All arrangements are part of the evolutionary setting of humankind, either because of (evolving) humans taking part in them, or because of other living beings which evolve and are part of them. Autopoietic change in arrangements is the norm, not the exception. If we want things to stay as they are, things will have to change. This is true for all species, as has been pointed out by evolutionary biologists since the mid-1970s, when Leigh van Valen coined the term “Red Queen Hypothesis”²³ describing the arms race of co-evolution.

We are bound to the maintenance of our arrangements; legacies of earlier interventions (one could think of radioactive waste from nuclear power plants, situated on the Danube’s banks and cooled by its waters) have a profound impact on our and our descendants’ practices. We need to perceive our environment to construct arrangements; and it depends on our perception, how we construct them. No work can be pursued without perception of the material layout it is supposed to interact with. Perception is inescapably tied to motives of the perceiving actor, and hence, inescapably subjective and driven by interests. Political issues are not excluded from the world by focussing on the nexus of practices and arrangements; they are fully integrated via the investigation of perception. Using the concept of socio-natural sites, the conditionality of possible practices on a sustainable set of arrangements becomes clearly visible and can serve as the basis for planners, who should ask about the fate of humans in the arrangements they propose to harvest the Danube’s exergy. None of the arrangements built with fossil fuels can be maintained indefinitely, neither power plants, nor large-scale flood protection dykes. A sustainable society based on renewable energy will have to deal with the legacies from exergy-dense arrangements. Older arrangements (such as rectification works)

²² Reckwitz, *Grundelemente einer Theorie*, p. 291.

²³ Cf. Quental et al., *How the Red Queen* for a recent application.

influence younger ones. This changes the realm of possible actions for humans; therefore, older arrangements influence the practices of humans today. We call these socio-ecological legacies. It has to be pointed out that most of the intervention create irreversible legacies. Only in a long-term perspective, including history and covering at least centuries, the profound difference between pre-industrial and industrial arrangements becomes clearly visible.

Examples of needed environmental histories in the Danube River Basin

From the difficult re-creation of a floodplain area in Neuburg between km 2470,5 and 2472,6, down to the vast Biosphere reserve in the Romanian Delta area, the Danube River Basin exhibits a plethora of environmental problems, among them hydromorphological change, pollution, flooding, loss of biodiversity and the almost total demise of fisheries. Global climate change will exacerbate many of these problems. Environmental legacies abound and current conflicts of use are particularly intense in the riverine landscapes. A humanities' perspective on the effects and adaptability of societies and cultures to global climate change is urgently needed. Given the diversity of environmental problems along Europe's most international, and, second to the Volga, longest river, one could create environmental histories centred at the study of pollution and its effects, concentrating on the connections between the river and environmentalism in communist and post-communist times, on the effects of changing climate on river dynamics, on the changes the Danube underwent as it or parts of its ecosystems were transformed into different resources, their use and abuse and its environmental effects, one could focus the study of conservation history and might consider the environmental effects of war or histories of the human body in polluted environments. All these can be told through the narrative of changing practices and arrangements, telling the story of the Danube as an ever-changing and ever changed socio-natural site.

Many things with a bearing on sustainable development have happened in the basin. One of the most fascinating results of paleo-ecological modelling is the influence of changing land-use from c. 1000 C.E. onwards on the evolution of the Danube Delta, one of the few landscapes in the basin considered relatively unaffected by human influence. It seems that the delta owes its existence in the form it is now to the widespread clearing of forest for agriculture in the upper basin, which changed the sediment load of the river markedly.²⁴ Over the course of the past few years, the interdisciplinary team of the Centre for Environmental History in Vienna has reconstructed the long-term history of human interventions into the Danube in Vienna. They have been able to show that serious attempts to redirect the river flow started as early as the fifteenth century.²⁵

²⁴ Giosan et al., *Early Anthropogenic Transformation*.

²⁵ Hohensinner et al., *Changes in water*.

But even if results such as this challenge our very idea of naturalness, the more recent past, the year 2000 might be an even better example for long-term legacies. In January, that year, a mining accident happened and cyanide was spilled in Baia Mare and later a similar incident occurred in Baia Borsa, in March 2000. On the evening of January, 30th, 2000, a tailings pond dam burst at a facility near the city of Baia Mare, Romania, which was reprocessing old mining tailings and re-depositing the waste sludge into a new tailings pond. This led to approximately 100,000 m³ of waste water containing up to 120 tonnes of cyanide and heavy metals being released into the Lapus River, then travelling downstream into the Somes and Tisza rivers into Hungary before entering the Danube. On March, 10th, 2000, another tailings dam burst in Baia Borsa in the same region close to the Ukrainian border. While some of this material was retained within the dam complex, 20,000 tonnes of sediments were released into the Novat River, a tributary of the Viseu and Tisza rivers.²⁶

There are many industrial hot spots in the Tisza river basin. Baia Mare is a region of particularly intensive industrial development and this led to many incidents. Scientists have therefore studied the environmental legacies in the area.²⁷

The most important finding were the high concentrations of heavy metal pollutants in sediments, higher than those in the water shortly after the spill. It means that the concentrations of heavy metals are long-standing. As dangerous as spills might be, the environmental problems of the area have not arisen in recent years. Macklin et al. sum up their findings: "Indeed, more widespread contamination is clearly arising from ongoing mining activity in the Cavnic, upper Lapuş, Sasar and Tisla catchments. While not downplaying the short term ecological effects of the spills, they should be seen more as compounding much longer term problems associated with many decades of poorly regulated, and largely untreated, industrial, mining and urban discharges into local rivers."²⁸

What can be learned from the Baia Mare spill and the astounding results of this study? Legacies of past practices determine the river development today. Legacies have to be accounted for when sustainable development is aimed at. The contamination is stuck in the sediment. If it moves, e.g. due to floods, pollutants are re-released into the environment. It is easy to stipulate that pollution should be stopped. But the victims should not be blamed as villains. People do not pollute for fun, they pollute because economic considerations make this a viable option. Sustainable development has to take this into consideration. Ecologically sound policies have to be assessed for their economic and social consequences and environmental historians are needed to deal with legacies by elucidating the complex social situations from which they arose.

²⁶ EU, *Report of the International Task Force*.

²⁷ Rico et al., *Reported tailings dam failures*; Schulz et al., *Hochwasser, Zyanid und Blei*; Macklin et al., *The long ter fate*.

²⁸ Macklin et al., *The long ter fate*, p. 256.

Instead of a conclusion: Conflict as a sustainability problem

Peace or war make a difference in terms of sustainable development. People in the Danube region fought for centuries and have left all kinds of legacies, but the sustainability problems created by the most recent conflicts are the most dangerous. The UNEP has a database for post-conflict environmental reports. In the report on the Kosovo war,²⁹ the infamous depleted uranium penetrators are depicted. The uranium is not used because it is radioactive, but because it is a heavy metal, and because it is so heavy, it penetrates very well. But this issue, which received widespread media coverage is not the major problem of the legacy of the Kosovo war.

The legacies of the recent war in the Balkans are varied. A bombed oil storage facility in Bor, a destroyed oil tank at Novi Sad point to the pollution legacies of the war, one of the sustainability challenges that we face is to overcome the legacy of war. This is a task for the humanities, a task for the social sciences, it cannot be solved by natural sciences. As long as nations fight against each other, sustainable development will be compromised. Each war creates new legacies not just of pollutants and destruction, but also of conflict and trauma, which have to be overcome.

But back to the pollution issues. Pančevo has become famous for 250 tonnes of liquid ammonia spilled into the Danube during the war. UNEP reports about this incident: “As a preventive measure, about 250 tonnes of liquid ammonia was released into the open canal from the fertiliser plant by site managers fearful a direct air strike on stored ammonia could kill large numbers of people. This release was probably responsible for fish kills reported in the Danube, up to 30 km downstream. Fertiliser production prior to the air strikes had been accelerated in order to minimise the quantity of ammonia in storage.”³⁰ So, site managers had done every possible thing to keep the damage small – but had to decide between risk for people or damage to the environment. In the water of the Danube, due to the Balkan war, a lot of extra pollution was found. Again in the wording of the report: “Serious leakages of 1,2-dichlorethane (EDC) and mercury; burning of vinyl chloride monomer (VCM) to form dioxins; burning of 80,000 tonnes of oil & oil products releasing sulphur dioxide and other noxious gases; high concentrations of EDC found in water of canal running into the Danube; high concentrations of mercury and petroleum products in the canal sediments.”³¹ Even more important are the social insights that UNEP formulates in conclusion. “Social, economic and administrative disruption are likely to cause an increase of pressure on natural resources, both within and outside protected areas (e.g. increased use of wood for cooking and heating, due to loss of electricity supplies). Tourism, and the income it generates will also be reduced, though, it should be recalled that development of skiing infrastructure in Kopaonik had been reported as a conservation problem. Experience from reconstruction activities in other Balkan countries shows that future reconstruction in Yugoslavia will place heavy demands on raw materials

²⁹ UNEP, *The Kosovo Conflict*.

³⁰ *Ibid.*, p. 35.

³¹ *Ibid.*, p. 32.

(e.g. gravel, rock, wood products, water). The Federal authorities responsible for telecommunications facilities within protected areas formerly paid rent to the protected area concerned (though reportedly not for facilities located in Montenegro). The future of these financial contributions is unclear.³²

One sentence from the UN report which points to the political ramifications of the Kosovo [and any other] war can serve as a fitting conclusion: “An unhealthy and dangerously polluted environment does not provide a sound basis for the well-being of human populations or for business and trade. However, the implementation of the recommendations will not only depend on the availability of funds; political concerns related to the international embargo of Serbia will also have to be taken into account.”³³

War and the havoc it wreaks are not a pleasant subject to talk about, but there is an important point to learn: If the past is not confronted, it will continue to haunt society. But, on the other hand, if the past is included into considerations, it turns into a unique learning opportunity. With this knowledge, we can try to prevent wars and their environmental legacies from happening again.

The larger point included here is that democracy itself needs sustainable development. But we can also turn this sentence around: sustainable development needs democracy. In an ecologically degraded world, long-term economic development is impossible and social unrest will increase. Environmental historians are called to action in Central Europe to contribute with their skills to democratic and sustainable development.

Challenges and opportunities for a research program for Central Europe

From the uranium mines of Jachýmov in north-western Bohemia in the Czech Republic to the mercury mines of Idrija in Slovenia, there is an unexamined, long-term history of toxic bodies. Of equal importance is the study of landscapes as ideas formed by viewers of their physical surroundings, of landscapes experienced, landscapes transformed, and landscapes degraded. Nature and Nation play out differently in each Nation. Nature’s Nation³⁴ vs. Valentin Nicolescu’s Nature and Identity in the Construction of the Romanian Concept of Nation³⁵ are a case in point. Nature in nation-building in peripheries and late modernizers is a topic for historians but also of importance to environmental policies which are implicitly built on such concepts. Borders, Blocks and Ideologies are also a field of research for long-term histories. Central Europe has been a zone of conflict for thousands of years. A region once characterized as part of the limes became the battlefield between the Ottoman and the Habsburg empires, only to be split between NATO and “the West” and the communist Warsaw pact regimes. In detailing what I have

³² Ibid., p. 68.

³³ Ibid., p. 72.

³⁴ Opie, *Nature’s Nation*.

³⁵ Nicolescu, *Nature and Identity*.

tried to show above, environmental historians of Central Europe might wish to ask, how certain practices via arrangements created long-term legacies, changed natural characteristics, influenced rural communities and urban elites, lead to conflict between actors and created long-lasting legacies. Their results could and should become the basis of sustainability-oriented policies in Central Europe.

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Tracing flood histories is one example for the challenges of writing environmental histories in Central Europe. Two quite different sets of skills are needed. One set is the historian's craft. The historian works at making sense of sources, constructing a compelling narrative from chaotic facts, tracing human appreciation of the Danube, human uses of the Danube, human interventions into the Danube The skills of the landscape ecologist, the hydrologist, the historical geographer, the geomorphologist and many other natural scientists are needed for the second building block. We need reconstructions of past riverine landscapes, ecosystems, of paleo-meanders and we need a chronology to answer questions of cause and effect – what was first, the intervention or the problem? Without knowing about the substrate of perceptions of historical actors, we cannot evaluate their perceptions for our narrative. How does the river the newspapers are talking about actually look like? Very different from how we perceive it today. Both are necessary, none is more important, both skills are of equal importance for an environmental history of the Danube River Basin.

(Verena Winiwarter)

In the immediate vicinity of the medieval Ljubljana there were extensive woodlands, stretching far into the hills in the southeast and northwest. ... The greater part of Ljubljana's supply with wood, however, came from areas further away, 15–20 kilometres from the city. ... In the time of need, as during the threat from Ottoman incursions in 1478, when Ljubljana was strengthening its fortifications, the king allowed the citizens unlimited use of wood from any forests in the immediate vicinity. ... [A] unique source ... dates back to 1510, the time of war between Austria and the Republic of Venice. Therein Emperor Maximilian ... ordered his captain in Ljubljana that he should, together with the citizens, enclose or fence ... forests and prohibit the cutting, so that the young trees could grow and the forests could flourish again, to provide for the needs of his city and castle in the future.

(Miha Kosi)