

Ecoremediation and Slovenia's Development Programme

Sustainable Preservation and Treatment of the Environment



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Ecoremediation techniques are natural systems for the protection and renewal of the environment. They can also be defined as the sustainable preservation and treatment of the environment, since their use increases the environment's ability to defend itself. Through different ecoremediation processes we can create or recreate the conditions that are characteristic of natural systems, i.e. diversity of biotopes and maintenance of ecosystemic balance.

We discussed ecoremediation with Dr Danijel Vrhovšek, who has been involved in the fields of water ecology and constructed wetland systems for a number of years. "Awareness of the importance of ecoremediation is spreading among an ever wider circle of people," claims Dr Vrhovšek. "In technical terms matters are clear. People know what we want and that we have to treat the environment differently from how we have treated it in the past. We still have a great deal more work to do before this becomes a way of life, for ecoremediation principles to be built into regulations, and for us to observe them consistently."



Dr Ana Vovk Korže of the IPVO (Institute for the Promotion of Environmental Protection) in Maribor, who in conjunction with Dr Vrhovšek has recently written a booklet entitled *Ecoremediation for effective environ-*

mental protection, adds the following: "Building ecoremediation into regulations is actually already happening. At the start of 2006 the environment ministry adopted a resolution on the inclusion of ecoremediation as a stand-

The main difficulty in the use of ecoremediation methods in practice lies in the fact that they require changes to certain systemic solutions and established procedures and, in many ways, a change of mentality. Interestingly, in all environments facing environmental problems (mainly municipalities), there is agreement with ecoremediation principles. The problem is that the various contractors equipped with heavy machinery offer old solutions. And regulations also allow this...

ard in all documents and strategies dealing with the environment. Naturally this does not in itself mean the implementation of an ecoremediation approach in practice. The main obstacle probably lies in the fact that many of those responsible for making decisions on developments know too little about ecoremediation. That is why we also devote particular attention to education, from practical training to education at the university level. Informing the public is a chapter unto itself. Here we have to show as best as possible how every individual can use various forms of ecoremediation in his or her everyday life. I am convinced that – with the appropriate support of the state – we also need to promote ecoremediation as a development opportunity for Slovenia. We want to bring Slovenia over the next few years into the company of the most developed countries. In our opinion one of the ways to achieve this is through ecoremediation techniques. In Slovenia they represent the best possibility for environmental protection, and this is a starting-point for the development of ecotourism, spa tourism, sustainable agriculture, and so on."

Help for nature

"A few years ago," explains Dr Vrhovšek, "if you searched for the term 'ecoremediation' on the web you would only get a handful of hits. Today a search returns hundreds of pages. Ecoremediation essentially means the transfer of natural systems and processes for the protection and renewal of the environment. If something goes wrong, or if you feel that something is going to go wrong, you use ecoremediation. You actually look at nature, how it reacts to specific events, and then you help it in the direction in which

Different types of ecoremediation processes

- natural ecoremediation; pools, waterfalls, meanders
- old ecoremediation; basins, pools, hedges
- new types of ecoremediation; constructed wetland systems, ecological drainage ditches, wind barriers, buffer zones
- ecoremediation for the remediation of irregular developments; revitalisations, renaturations, phytoremediation, purifying drinking water sources.

it would go anyway. We know, for example, what plants are best at purifying sewage water and we plant them in constructed wetland systems. We know what plants are best at absorbing heavy metals, and we plant them to purify seepage from landfills. We know what plants are best at retaining moisture along drainage ditches. If we know that Celje, for example, is at risk from flooding, then it does not make sense or rather it is too late to build defensive dykes in Celje. Instead the water of the Savinja has to be retained up in Logarska Dolina and slowly released downstream. Ecoremediation does not only relate to the water environment but to all processes that nature tries to remedy itself: human beings merely channel them and accelerate them. And because we are using natural processes, we actually have countless possibilities. The properties of nature can even be adapted – if we know enough about it. We can retain more water, we can increase its ability to purify itself, we can increase biodiversity or do all these things at once. Whatever we need in the given situation.”

Drainage ditches are a typical example of how not to proceed. Today in Prekmurje, in northeastern Slovenia, the water level is getting lower and lower. We should be retaining this water, increasing its ability to purify itself and last but not least restoring the habitat so that it can maintain individual animal species, be this the otter, the black stork or something else. Multiple purpose of use is one of the advantages of ecoremediation techniques. As Dr Vrhovšek explains, “in past centuries man did many things correctly, in harmony with nature – until the technical revolution arrived. Then it seemed to him that he could solve all difficulties with machines and he forgot about natural processes. A good



If nature is given time, it generates its own rich vegetation, which increases.



The maintained stream becomes a drainage channel which does not perform the natural functions of a watercourse (above). With the return of vegetation, the watercourse regenerates the natural self-cleaning functions. The aquatic and surrounding ecosystems once again become a habitat for numerous animal species.



Treatment facilities based on vegetation do not require extensive and costly construction works.

At the same time they efficiently purify various waste waters.



example of this are the retention basins on the Karst, known as *kali*. The Karst-dwellers knew how to retain water in them and to purify (recycle) it with the help of plants and then, during the dry season, use it to water their livestock and irrigate their crops. Typical plants began to grow there, individual species of animals came and created a diverse habitat. This was actually a fine example of ecoremediation, except that they were not aware of it. Today they simply sink their pumps in the nearest stream and pump almost all of the water out of it..."

Over millions of years nature has developed extraordinary defences of its own. The point of ecoremediation is that we take advantage of these complex natural systems for individual remediations or for preventive procedures. In doing so we have the assurance of natural "experience" to tell us that it works. When using ecoremediation procedures it is impossible to get it completely wrong.

An opportunity for Slovenia

"Slovenia is one of the last countries in Europe to still have relatively well preserved ecosystems," explains Dr Ana Vovk Korže. "In other countries such as the Netherlands and Germany these have long since been destroyed by intensive industrialisation. For this reason we have the opportunity to protect our ecosystems, through ecoremediation. As much as half of the territory of Slovenia is protected in one way or another (Natura 2000, regional parks, protected landscape areas, national park). Where we have already destroyed the natural balance, we can re-establish sustainable environments. And Europe is very interested in seeing such processes and getting to know them in a real environment. And this is an additional opportunity for us. Because of our small size, we can act as a kind of ecoremediation pilot project for the whole of the EU, where ecoremediation is currently a hot topic. The whole of Europe is moving into renaturation processes, and we have the knowledge and natural conditions for this. If we fail to use this opportunity, someone else will overtake us."

Last but not least, it should be noted that ecoremediation does not take business away from existing "hydroengineering" companies. Ecoremediation systems need to be maintained after being installed. "In the revitalisations that are being carried out in Prekmurje," says Dr Vrhovšek, "they are

employing individuals from the difficult-to-employ category. And these are long-term jobs. With ecoremediation you are not dependent on foreign technologies either."

Given the undoubted advantages of ecoremediation techniques, why are they being put into practice so slowly? The main obstacle is that investments in ecoremediation give a return over the long term. There are no overnight profits. If you start protecting groundwater today, the results will be evident after a decade or even two. This means that ecoremediation is not interesting to investors. An investor who has the money to build an extensive water supply system, with long pipelines, is not interested in the ecoremediation of polluted village springs.

"That is why we want ecoremediation, which is the only sustainable method of environmental protection, to be a legally regulated possibility or alternative in developments of this kind, and in others too," explains Dr Vrhovšek.

A difficulty and yet at the same time an advantage of ecoremediation activities is that they require the involvement of different sectors. Waters polluted by pesticides are not only an issue for the agricultural profession, but for hydrologists, the medical profession, lawyers, and so on. "At the national level," explains Dr Vovk Korže, "there is already interest in trying to interconnect things. But these are lengthy processes. Our very concrete contribution to this will be an ecoremediation project supported by the Ministry of the Environment and Spatial Planning in the municipality of Muta, which is an example of the integrated regulation of a catchment area. There we are not merely addressing past problems. Instead, we will show how it is possible to develop a specific area holistically, since ecoremediation is also (or above all) a development component, and not merely a remediation method. Next it will be the turn of Radlje ob Dravi, and we will continue all the way to Maribor. Even in urban environments there is interest in ecoremediation for individual nature protection segments."

Some examples of ecoremediation

Naturally what interests us most are the ecoremediation projects that have already been carried out. There are already quite a number of these. In Velika Nedelja (near Ormož) a constructed wetland system (CWS) was

built in 2000 to treat municipal wastewater from settlements for 400 pollution units (PE). The same year a similar CWS was built in Sv. Tomaž, also in the vicinity of Ormož. In Središče ob Dravi, a CWS for the treatment of industrial wastewater and sewage from the Gosad food processing plant (Droga Portorož) has been operating since 1991. In 2000 a CWS was built for the treatment of seepage from the municipal waste dump in Ljutomer. In 2002 sustainable remediation was carried out of the Dobrava municipal waste landfill (Ormož). The remediation includes a plantation of trees acting as a water barrier, constructed wetlands for the treatment of seepage and an irrigation system to exploit the purified water. This year a CWS for municipal wastewater with a capacity of 300 PE began operating in Motovilci in the Goričko region. Also in Goričko, in Gerlinci, a pilot CWS for the conditioning of microbiologically contaminated water from the well has been installed by Limnos. There are already more than 60 constructed wetland systems operating in Slovenia too.

The best proof of the effectiveness of ecoremediation is the return of wildlife, for instance the small white heron, to the aquatic environment.



Photo: Davorin Tome