



(Draft of)  
National background report on Environment for Croatia

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## **1. Purpose of strategic research agenda for Environment**

The main objective of this document is to provide a summary of research activities in the field of environment in the Republic of Croatia along with a SWOT analysis of research capacities and identification of research priorities in order to facilitate the interaction between the WBCs and the EU member states in the area of science and technology.

The consultation process started in March 2009. The key stages in the consultation process were data collection that includes surveys of stakeholders by interview or questionnaire and data review and analysis.

However, due to the complexity of the scientific issues involved and due to the difficulties in scheduling the face-to-face discussion and exchange of views among all stakeholders, this overview is by no means overarching and complete. Thus, for determining a final set of research priorities in the field of environment, a larger number of stakeholders need to be involved in the process.

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## **2. The Environment S&T system in Croatia**

### The current state of the environment

Croatia has a relatively well-preserved environment compared to the situation in the EU, mainly due to the relatively low level of heavy industrial production over the past decades and its correspondingly low detrimental impact on the environment. It is distinguished by a great biological and geographical diversity and it has relatively abundant fresh water supplies. However, investments in the environment sector and the level of environmental protection are lower than in developed European countries. That especially relates to the solid waste and wastewater management, along with the establishment and maintenance of a sustainable water supply system<sup>1</sup>.

Municipal waste presents a significant environmental problem in Croatia. In 2005, municipal waste production per capita is estimated at 327 kg/person/year. Further increase in municipal waste generation is expected due to continuous economic growth, tourism development and increase in general consumption. Landfilling of unseparated/mixed municipal waste continues to be the dominant waste management method in Croatia. Croatia has a high potential for recycling since a large proportion of the waste currently going to the landfills is actually recyclable (approximately 2% of total municipal waste generated was collected separately and recovered, 1% was composted, and 79% was disposed at landfills<sup>2</sup>). It is assessed that 66.5% of municipal waste refers to biodegradable waste.

In relation to the separation and recycling of waste, the state has been improved by adoption of new legislation for management of specific waste stream (packaging waste, waste tyres,

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<sup>1</sup> Strategic Coherence Framework 2007-2013, Instrument for Pre-accession Assistance, Republic of Croatia, Central Office for Development Strategy and Coordination of EU Funds

<sup>2</sup> Indicator Fact Sheet – Theme WASTE, Croatian Environment Agency

waste oil, end-of-life vehicles, waste batteries and accumulators) in compliance with EU requirements and beginning of their implementation in 2006.

Little more than 50% of non-hazardous industrial waste generated is sent to licensed landfills or separated. Almost the same amount of waste is deposited in illegal dumpsites which are assessed at 3000. There are 281 controlled municipal waste landfills with an active capacity of 69,402,670 m<sup>3</sup>. However, only 25 are totally in compliance with relevant plans/legal provisions and have all necessary permits and they constitute only 37% of this active capacity. The state has been significantly improved by remediation and closure of 229 municipal landfills initiated in 2004 and co-financed by the Environmental Protection and Energy Efficiency Fund (EPEEF). There is also an ongoing process of a gradual remediation of illegal dumpsites and sites highly polluted by waste (hot spots).

According to the UN FAO database the renewable resources of freshwater per capita amount to 23.8 m<sup>3</sup>, indicating relatively high quantities of good quality fresh water. Approximately 76% of population has access to the public water supply system but this varies considerably from one location to another. Moreover, there is a growing seasonal demand for water in coastal area and islands during the hot summer months and tourism peaks.

The main source of public water supply is groundwater (about 90%). Drinking water supply sources are protected through legally defined zones of sanitary protection. Due to age and lack of network maintenance the system has become very permeable resulting in losses of around 46% of the total abstracted water.

In addition, the presence of pharmaceutical compounds and personal care products currently found in municipal wastewaters indicates poor wastewater management practices and thus the environmental fate of these compounds in natural waters is attracting increasing attention<sup>3</sup>.

Only 12% of wastewater is treated and only 4.4% of the total wastewaters are subject to biological treatment in 82 wastewater treatment plants (WWTP). Concerning industrial wastewater, around 20% is being treated in independent industrial WWTPs and then discharged. Of this quantity, around 50% is discharged into a public sewer after preliminary treatment and 30% is discharged directly with little or no pre-treatment.

Moreover, it is estimated that only 40% of the population is connected to the public sewage network, whose length is approximately 6 000 km. The levels of connection to sewerage systems are in overall quite low, and they vary significantly depending on the size of settlement.

## 2.1 The Croatian Environmental policy framework

This section will provide the overall policy framework pertinent to environmental research in the Republic of Croatia and present the main elements of environmental research policy making.

### 2.1.1 The overall policy framework

The Constitution of the Republic of Croatia determines that "conservation of nature and the environment...are the highest values of the constitutional order of the Republic of Croatia and

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<sup>3</sup> Terzic et al., 2008. Occurrence and fate of emerging wastewater contaminants in Western Balkan Region. *Science of the Total Environment* **399**(1-3): 66-77.

the ground for interpretation of the Constitution" (Article 3). Furthermore, the Constitution emphasizes the right to a healthy environment and the commitment to the protection of human health, nature and the human environment (Article 69).

Environmental protection requirements must be integrated into all relevant sectoral policy areas (transport, energy, agriculture, tourism, etc.). Hence, environmental protection should be an integral part of transport infrastructure development, as well as of energy, agriculture, and industrial development. Besides the preservation of the biological and geographical diversity, the Adriatic seacoast and islands and the corresponding municipal infrastructure, such as water supply, sewage and waste water treatment infrastructure and waste infrastructure, are preconditions for the long term development.

The national environmental policy framework in Croatia includes:

- Strategic Development Framework 2006-2013 (SDF) which is the overarching document;
- National Environmental Strategy (NES); and
- National Environmental Action Plan (NEAP).

NES is subsequently supported by sub-sector strategies, such as the National Waste Management Strategy and the draft National Water Management Strategy, as well as the National ISPA Strategy for Environment.

### **2.1.2 The elements of environmental research policy making**

According to the strategic document Science & Technology Policy of the Republic of Croatia 2006-2010 main objectives of the science programme of the Croatian Government are:

1. Increasing investments into research and development, and their efficiency
2. Restructuring Croatia's science system
3. Strengthening cooperation between science, government and industry in the creation of new knowledge and goods
4. Increasing participation of Croatian scientists and other bodies in EU Framework Programmes

Although these goals are of general character, there are certainly relevant for environmental research field.

Based on this document, prepared by the Ministry of Science, Education and Sports, a detailed Action Plan is provided in order to define priorities in the implementation. In the Action Plan 2007-2010 (Science & Technology Policy of the Republic of Croatia) it is stated that the Croatian S&T and innovation policy must be compatible with that of the EU which emphasizes:

- Coherence of innovation policies
- Regulatory framework conducive to innovation
- Encouragement of creation and growth of innovative enterprises
- Improvement of the key interfaces in the innovation system
- Society open to innovation but also take into account the specifics of the Croatian situation.

The Science policy and Technology policy are closely interrelated, both intersecting and complementing each other, with mutually interdependent objectives and outcomes. The Action Plan 2007-2010 presents strategic research priorities accepted on 25 October 2005 by the National Council for Science. Some of these priorities are of national interest and others are in line with EU Framework programmes (especially FP6 and FP7). Priorities are divided in two groups regarding the implementation period. The long-term priorities are:

- Knowledge-driven basic research
- Environmental protection and economic development of the Karst regions; Adriatic Sea, coast and islands
- Agriculture; Biotechnology; Food
- Health
- Information and communication technologies
- Nanoscience; New materials, construction and new production processes
- Energy; Sources of alternative and renewable energy; Transport and security
- Social and human sciences; Croatian identity
- Social integration, learning and education; Lifelong learning

The short-term priorities are:

- Environment (Adriatic Sea, coast and islands; Karst region)
- Health (Food; Agriculture; Biotechnology; Social aspects of health; Health systems)
- Energy and Materials (Alternative and renewable energy; Bio-nanomaterials)
- Croatian Identity (Croatian contribution to culture, religion, art and sciences; Croatian language)

## 2.2 Overview of ENVIRONMENT research activities

As official funded projects databases do not recognize environment as separate research area or category, nor detailed breakdown for different research fields exists, the overview presented here is far from being complete or comprehensive.

This overview presents currently funded research projects which were recognized as those belonging to research area of environment. Since research projects are coming from different fields of science, both overview of major research topics and the infrastructure for environmental research are not adequately addressed.

The Ministry of Science, Education and Sports is currently the main funding body for scientific activity which is provided mainly through competitive scientific programs and projects. Pursuant to the Act on Scientific Activity and Higher Education, scientific activity is conducted at the universities, public research institutes, research institutes, Croatian Academy of Sciences and Arts and other legal persons duly registered in the Register of Scientific Research Legal Persons. The Ministry also invites tenders for financing the scientific infrastructure. Based on the evaluation of application the Ministry, in cooperation with research entities, signs agreements and monitors and evaluates their implementation in interim and final reports.

Besides the Ministry of Science, Education and Sports, there are a number of other state agencies responsible for funding S&T research activities in Croatia.

The National Foundation for Science, Higher Education and Technological Development ([www.nzz.hr](http://www.nzz.hr)) was established in 2001 with a special purpose to promote science, higher education and technological development in Croatia and with the basic objective to develop economy and promote employment.

NFS has been building its mission based on the Article 3 of the Law on National Foundation for Science, Higher Education and Technological Development of the Republic of Croatia (14th December 2001).

NFS supports scientific, educational and technological programmes and projects and encourages international cooperation within higher education. NFS also supports the realisation of scientific programmes within the field of special interest of basic, applied and developing researches. NFS funds programmes of the higher education that will result in innovations and patents and programmes within higher education, science and technological development that gives the scholarships to the talented students (graduate and postgraduate) especially to younger and significant scientists in economy and research and high education institutions in Croatia.

The other important state agency is Croatian Institute of Technology – HIT (<http://www.hit.hr>) provides support and guidance for national technological development, monitors and anticipates global technological trends, provides advice and support in the area of intellectual property protection and transfer of technologies. The Institute also provides integration and linkage of scientific research with other segments of the social and economy system in order to set up adequate conditions for innovation and new technologies development. Furthermore, HIT supports Croatian participation in European programmes for research and development and hosts the National Contact Points for the European Communities FP7.

Unity Through Knowledge Fund – UKF (<http://www.ukf.hr>) is another funding body established by the Ministry of Science, Education and Sports with the support from the World Bank. UKF supports research that is competitive on international level, fosters research that creates new values in Croatian economy and finances projects that help the development of research infrastructure in Croatia. It also finances collaborative research projects and knowledge-based business activities of expatriates and Croatian researchers, institutions and companies.

### 2.2.1. Environmental research projects

Since there is no systematic data of research projects within the environmental field, this overview is based upon a list of projects among different fields of science, which were recognized as those belonging to research area of environment.

The Ministry currently provides funding for 90 scientific projects with average yearly amount of 84,660.00 kn (€11,516.00). More than 56% of these projects are conducted on the following ten top institutions.

1. Ruđer Bošković Institute
2. University of Zagreb, Faculty of Science
3. University of Zagreb, Faculty of Chemical Engineering and Technology
4. Institute of Oceanography and Fisheries
5. University of Zagreb, Faculty of Agriculture
6. Institute for Medical Research and Occupational Health
7. University of Zagreb, Faculty of, Mechanical Engineering and Naval Architecture
8. University of Zagreb, Faculty of Textile Technology
9. University of Zagreb, Faculty of Veterinary Medicine
10. University of Zagreb, Faculty of Electrical Engineering and Computing

The National Foundation for Science, Higher Education and Technological Development ([www.nzz.hr](http://www.nzz.hr)) in 2007 funded 5 environmental research projects with total amount of 1,579,331.00 kn (€214,874.97).

The Croatian Institute of Technology – HIT (<http://www.hit.hr>) in 2007 or later provided support for 3 national technological projects with environmental character with total amount of 1,831,000.00 kn (€249,115.65).

Finally, Unity Through Knowledge Fund – UKF (<http://www.ukf.hr>) funded one environmental scientific research project with value of €200,000.00.

**Table 1 Overview of state agencies funds designated for R&D in the field of ENVIRONMENT (in 2007)**

	Name	Financing R&D–Year	Financing R&D– Year
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