THE ENVIRONMENT IN YOUR POCKET 1 - 2007

CROATIAN ENVIRONMENT AGENCY

THE ENVIRONMENT IN YOUR POCKET

THE ENVIRONMENT IN YOUR POCKET I – 2007

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THE ENVIRONMENT IN YOUR POCKET

Introduction

A short presentation of the state of the environment in the Republic of Croatia, an overview of a selected set of environmental indicators and sector pressures, has proven to be successful and interesting for both the professional community and the general public. Following good practice, the Croatian Environment Agency presents new booklet - *The Environment in your Pocket I - 2007*. As in previous years we have attempted to provide a simple and clear overview of the situation in particular environmental segments by selecting several characteristic indicators.

The indicators for air and climate, inland water, sea and coastal area, biodiversity, energy, fisheries and aquaculture, agriculture and forestry utilise only a part of the data and databases collected or created by the Agency in order to ensure systematic monitoring, state analysis, traceability and comparability of the environmental data available from and processed by the Agency.

Public interest in environmental issues has intensified during recent years. This increase in interest is confirmed by numerous inquiries submitted to the Agency. We are glad to have been recognized as a source of accurate, timely and comprehensive environmental information in Croatia. This year's edition of *The Environment in your Pocket* includes a new indicator – the number and breakdown of inquiries submitted to the Agency during 2006.

We anticipate that this publication will answer some of your questions and thus contribute to a better understanding of the situation and changes in the environment. We also hope that it will encourage you to pose new questions and broaden your interest in environmental conservation and protection

Croatian Environment Agency

THE ENVIRONMENT IN YOUR POCKET

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THE ENVIRONMENT IN YOUR POCKET

Croatia – Basic Data

Mainland surface area	56 594 km^2
Territorial sea surface area	31 067 km^2
Coastline length	5 835,3 km
Islands, rocks, reefs	1 185
Highest mountain summit	Mt. Dinara, 1 831 m
Counties	21
Cities and municipalities	550 (124 and 426 respectively)
Population	4 437 460
Population density per km^2	78,5
Agricultural households	448 532
Populated islands	47
Language	Croatian
Alphabet	Latin
Political system	Parliamentary democracy
GDP per capita in 2006	EUR 7 706

Transboundary Waste Movement Database, source: CEA

CORINE Land Cover (CLC) Database, source: CEA

Energy in Croatia 2004, Annual Energy Report, source: MELE, February, 2006

Energy in Croatia 2005, Annual Energy Report, source: MELE, December, 2006

GEOL –Potentially Contaminated/Contaminated Sites Database, source: CEA

Pollutant Air Emission on the Territory of the Republic of Croatia in 2004, source Ekonerg d.o.o., Zagreb

Pollutant Emission Registry, source: CEA

Waste Inventory, source: CEA

Sanja Radović, Sandra Hudina, Anita Basioli, Trpimir Majcan (Čistoća d.o.o.): *Separate Waste Collection in the City of Zagreb – System Implementation and Development,* VIII International Waste Management Symposium, Zagreb, 2004, Proceedings, pp. 198-199.

Registers of Waste Carriers, Mediators and Exporters, source: CEA

Register of Waste Management Licences, source: Ministry of Environmental Protection, Physical Planning and Construction

2006 Statistical Yearbook, source: CBS

AIR AND CLIMATE

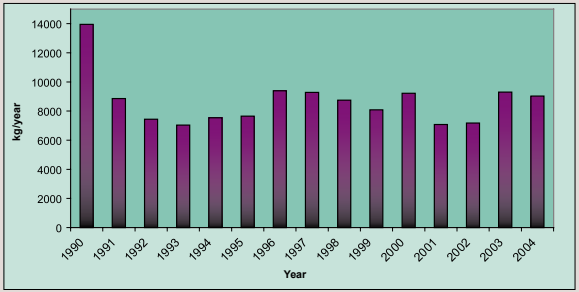
Polycyclic Aromatic Hydrocarbons (PAH) Emission

Polycyclic aromatic hydrocarbons (PAHs) are persistent organic pollutants which accumulate in living organisms, with a tendency for long-range transport and a detrimental impact on the environment and human health. According to the provisions of the *LRTAP Convention*, Croatia is obliged to make an annual calculation of its polycyclic aromatic hydrocarbon emissions.

Trend and current state

There are over 100 different polycyclic aromatic hydrocarbons. For emission calculations pursuant to the *LRTAP Convention,* four PAH compounds are monitored: benzo[a]pyrene, benzo[b]fluoranthene, benzo[k]fluoranthene, and indeno[123-cd]pyrene. The most important PAH emission sources are combustion in households and coke and aluminium manufacturing. Total PAH emission in 2004 was 9 tonnes, which is 3% less than in 2003. An overall emission trend was on the decrease (-35.2%) during the period 1990-2004. Pollutant emissions are analysed for 11 main sectors. The major sector is combustion in non-industrial plants (98%). Since other sectors combined contribute to the PAH emission with 2%, the diagram shows only total emission from all sectors.

PAH emissions in Croatia, 1990-2004*



Source: Ekonerg d.o.o.

Year	1990	1991	1992	1993	1994	1995	1996	
kg	13 951	8 861	7 439	7 035	7 542	7 649	9 390	
Year	1997	1998	1999	2000	2001	2002	2003	2004
kg	9 284	8 749	8 086	9 223	7 073	7 178	9 298	9 035

* PAH emission calculation for 2005 underway

AIR AND CLIMATE

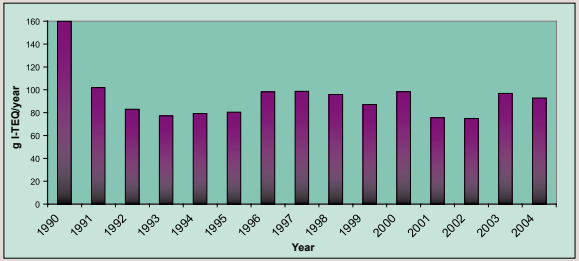
Dioxins and Furans (DIOX) Emission

Dioxins and furans (DIOX) are persistent organic pollutants highly detrimental for human health which affect the immune and reproductive systems. Their cancer-related effects have been confirmed. These compounds are by-products of combustion of organic substances containing chlorine at temperatures ranging between 250 and 400°C. The emission calculations are performed according to the *LRTAP Convention*.

Trend and current state

DIOX emissions are mostly generated by wood-fuel burning in households. Other processes contributing to the emission are: steel manufacturing, fuel combustion in power plants (thermal power plants, cogenerations plants and energy conversion plants), waste incineration and cremation. In 2004, DIOX emission was 92.8 g I-TEQ (gram International Toxic Equivalent), which is 4% less than in 2003 and 42% less compared to 1990. In 2004, the dominant DIOX emission sector was combustion in non-industrial plants. The emission in this sector, however, decreased by 39% compared to 1990. Contribution of manufacturing processes to DIOX emission decreased by approximately 37% between 1990 and 2004, due to reduced production in the ferrous and steel industries. Since other sectors combined contribute to the DIOX emission with less than 3%, the diagram shows only total emission from all sectors.

DIOX emissions in Croatia, 1990-2004*



Source: Ekonerg d.o.o.

Year	1990	1991	1992	1993	1994	1995	1996	
g I-TEQ/year	159.9	101.9	83	77.1	79.3	80.4	98.1	
Year	1997	1998	1999	2000	2001	2002	2003	2004
g I-TEQ/year	98.7	95.9	87.1	98.3	75.5	74.9	96.8	92.8

* DIOX emission calculation for 2005 underway

AIR AND CLIMATE

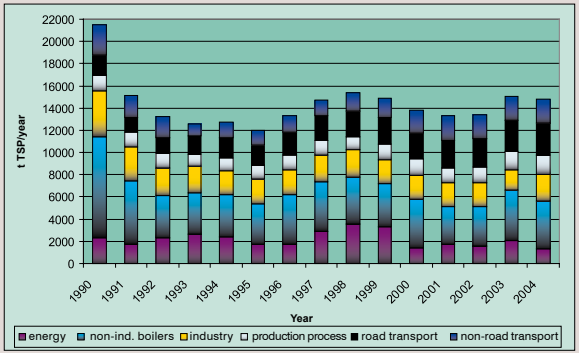
Total Suspended Particles (TSP) Emission

Calculation of total suspended matter emission is an obligation of the parties to the *LRTAP Convention*, including Croatia. Emission of suspended particles (dust, smoke, smog) have adverse effects on human health because they frequently cause chronic pulmonary diseases.

Trend and current state

In 2004, TSP emission was 14.8 ktonnes, which is about 31% less than in 1990. The major TSP emission source is combustion from non-industrial plants (28.9% of total emission). This sector is followed by road transport with 19.4%, combustion in manufacturing industry with 16%, non-road transport with 14.9%, production processes with 11.7% and combustion in power plants with 9.1%. The largest decrease compared to 1990 was recorded in combustion in non-industrial plants (-53%) and combustion in the manufacturing industry (-42%). The largest increase in TSP emission of 57% compared to 1990 was recorded in the road transport sector. This is due to an increase in the number of road vehicles and the quantity of spent car tyres and brakes.

TSP emissions in Croatia, 1990-2004*



Source: Ekonerg d.o.o.

Year	1990	1991	1992	1993	1994	1995	1996	
t	21 469	15 104	12 532	12 572	12 761	12 018	13 313	
Year	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
t	14 695	15 361	14 898	13 808	13 285	13 365	15 085	14 832

* TSP emission calculation for 2005 underway

AIR AND CLIMATE

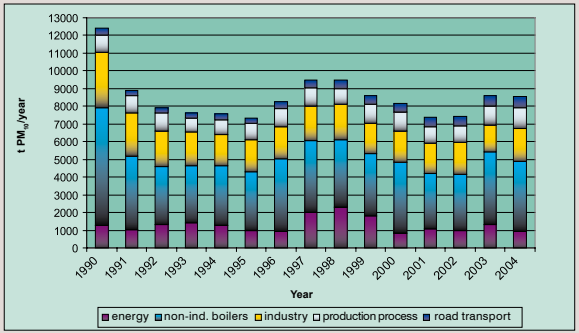
Particulate Matter (PM_{10}) Emission

Particles less than 10 μm in diameter have adverse health effects since they penetrate and deposit in air passages, thus causing inflammatory changes and affecting the immunity of an organism to allergies and infections. Calculation of PM_{10} emission is an obligation under the *LRTAP Convention.*

Trend and current state

In 2004, PM_{10} emission was about 8.5 ktonnes, which is approximately 31% less than in 1990. The major contribution to PM_{10} emission was from combustion in non-industrial plants with 46.3% of total emission. This sector was followed by combustion in the manufacturing industry with 21.4%, production processes with 13.9%, combustion in fossil fuel plants with 11.1%, and the road transport sector with 7.3%. A considerable increase in PM_{10} emission compared to 1990 was recorded in the road transport sector (+67%). The largest decrease in emission of 42% compared to 1990 was recorded in combustion in industrial plants, which is due to a decrease in fossil fuel consumption, namely, a fall in industrial production.

PM_{10} emissions in Croatia, 1990-2004*



Source: Ekonerg d.o.o.

Year	1990	1991	1992	1993	1994	1995	1996	
t	12 390	8 897	7 921	7 629	7 562	7 343	8 259	
Year	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
t	9 496	9 460	8 608	8 171	7 389	7 441	8 617	8 534

* PM_{10} emission calculation for 2005 underway

AIR AND CLIMATE

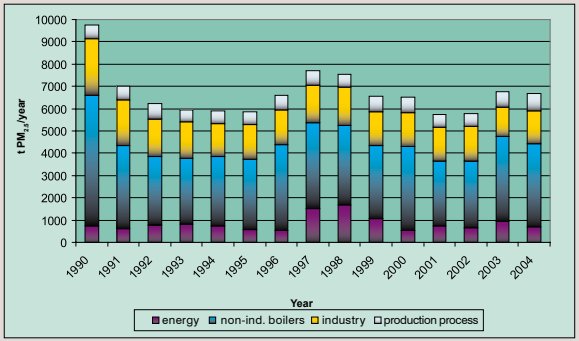
Particulate Matter ($PM_{2.5}$) Emission

Particles less than 2.5 μm have the most adverse health effects since they penetrate deep into the respiratory system. Pollutants responsible for adverse health effects are generally those from fraction $PM_{2.5}$. Calculation of $PM_{2.5}$ emission is an obligation under the *LRTAP Convention.*

Trend and current state

In 2004, $PM_{2.5}$ emission was 6.7 ktonnes, which is approximately 32% less than in 1990. The major contribution to $PM_{2.5}$ emission was from combustion in non-industrial plants with 55.7%. This sector was followed by combustion in the manufacturing industry with 22.2%, production processes with 11.4%, and combustion in power plants with 10.7%. The largest decrease in emission compared to 1990 was recorded in combustion in industrial plants (-42%) and combustion in non-industrial plants (-37%). The largest increase in emission of 24% compared to 1990 was recorded in production processes.

$PM_{2.5}$ emissions in Croatia, 1990-2004*



Source: Ekoneg d.o.o.

Year	1990	1991	1992	1993	1994	1995	1996	
t	9 771	7 009	6 219	5 943	5 884	5 864	6 603	
Year	**1997**	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**
t	7 721	7 537	6 539	6 504	5 735	5 773	6 764	6 666

* $PM_{2.5}$ emission calculation for 2005 underway

ENERGY

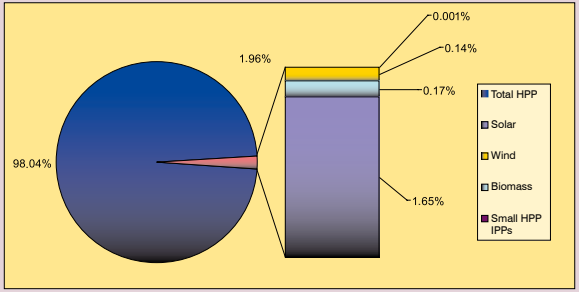
Renewable Energy Sources

Renewable energy sources increase system energy sustainability since they generate energy without relying on fuels of which there are only finite stocks (oil, coal, gas). Power generation from renewable sources also reduces greenhouse gas (CO_2) emissions and emissions of other pollutants (SO_2, CO, H_2S, NOx, particulate matter, heavy metals). The most widely used renewable sources are hydro power (hydroelectric power plants), wind energy (wind parks), solar energy (solar collectors), and biomass energy. However, like any other plants, plants generating energy from renewable sources cause an environmental impact, primarily on the landscapes, habitats and ecosystems.

Trend and current state

Of the total electricity available in Croatia, 52% is generated by renewable energy sources. Installed renewable electricity breakdown is: 98.04% of electricity is generated in large and small hydroelectric power plants within the Croatian Power (HEP) Group, 1.65% in hydroelectric power plants owned by IPPs, 0.17% from biomass, 0.14 % in wind parks, and 0.001% by solar collectors.

Renewable electricity sources in 2005



Sources: MELE, HPEI

ENERGY

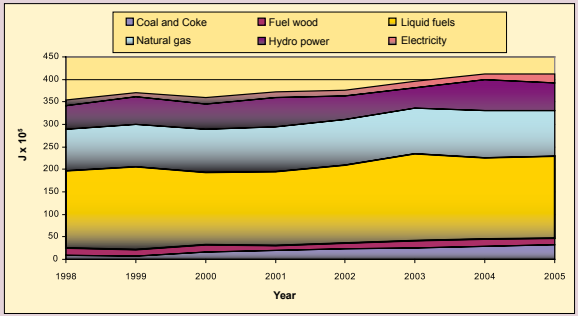
Total Energy Consumption in 1998-2005

Energy consumption is an indicator of the development of a country. A higher development level means higher energy demand. Depending on its type, energy could cause a more or less intensive environmental impact.

Trend and current state

In 2005, total energy consumption in Croatia recorded a slight decrease of 0.1% compared to the previous year. In percentages, the largest increase was recorded in consumption of renewable energy, but this is a negligible figure. A considerable increase was recorded in consumption of imported energy, as much as 39.5%, and in coal and coke consumption (11%), while consumption of liquid fuels recorded a minimum increase of 1.3%. Fuel wood consumption decreased by 6.9%, consumption of natural gas by 3.4%, and energy generated by harnessing hydro power decreased by 9.6%.
Total per capita energy consumption in Croatia was by 46.2% lower than in EU member states.

Total energy consumption, 1998-2005



Sources: MELE, HPEI

Year	1998	1999	2000	2001	2002	2003	2004	2005
Total energy consumption ($Jx10^5$)	354	370	360	372	376	396	412	412

WATER

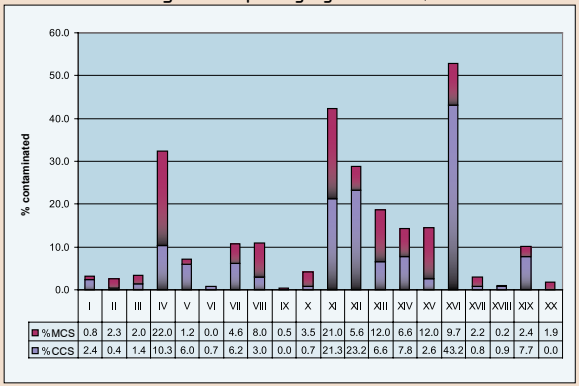
Drinking Water Quality

Quality of drinking water from public supply systems is monitored in order to protect public health. The public supply systems serve 76% of the population. The remaining 24% is supplied with water from local water supply systems and private wells, which are not included in permanent monitoring schemes.

Trend and current state

Number of connections to the public supply system is steadily increasing. Data available for 2005 indicate that water samples failing to comply with chemical and microbiological standards were determined in less than 5.9% and 5.5% cases, respectively. Differences in drinking water quality between counties are significant. The diagram shows that the highest percentage of water samples indicating chemical contamination (CCS) in 2005 was recorded in Vukovarsko-Srijemska (XVI*), Brodsko-Posavska (XII*), and Požeško-Slavonska (XI*) Counties, and the lowest in Lička-Senjska (IX*), Međimurska (XX*), and Splitsko-Dalmatinska (XVII*) Counties. The highest percentage of water samples indicating microbiological contamination (MCS) in 2005 was recorded in Karlovačka (IV*), and the lowest in Koprivničko-Križevačka (VI*) County.

Drinking water quality by counties, 2005



	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX
%MCS	0.8	2.3	2.0	22.0	1.2	0.0	4.6	8.0	0.5	3.5	21.0	5.6	12.0	6.6	12.0	9.7	2.2	0.2	2.4	1.9
%CCS	2.4	0.4	1.4	10.3	6.0	0.7	6.2	3.0	0.0	0.7	21.3	23.2	6.6	7.8	2.6	43.2	0.8	0.9	7.7	0.0

*Counties and the City of Zagreb numerical indications I to XX (enlisted in the Glossary), as stipulated by the *Act on Territories of Counties, Cities and Municipalities* (OG 86/06). Data for the City of Zagreb and Zagreb County integrated and given under No I

Source: CNIPH

WATER

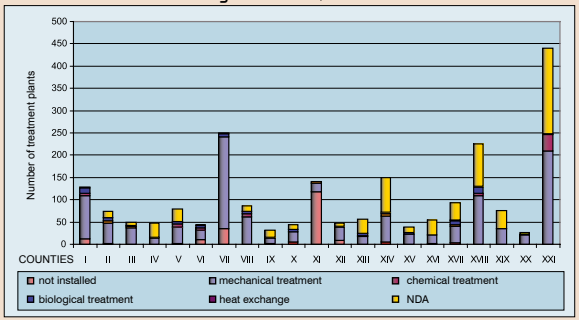
Industrial Wastewater Treatment

Discharge of untreated industrial wastewater into natural recipients (streams, sea) may cause numerous environmental impacts, including a potentially adverse impact on public health.

Trend and current state

About 50 % of industrial wastewater in Croatia is purified in wastewater pretreatment plants with the aim of achieving water quality equal to municipal wastewater quality. Pretreated water is discharged into the public sewerage system to be treated in the municipal wastewater treatment plant. Twenty per cent of pretreated industrial wastewater is discharged directly into natural recipients, while the remaining 30% is released without any treatment. The 2004 Pollutant Emission Register for sea/water received pollution emission data from 962 polluters covering 2 505 process units. The polluters submitted no data on installed treatment plants for 26% process units. Eleven per cent of process units have no wastewater treatment plants in place. Mechanical treatment facilities are used in 61.6% of process units. Chemical treatment facilities are installed in 4.8% of process units, and about 5% of process units have biological treatment plants. Heat exchangers are installed in only 0.05% of process units.

Number of industrial wastewater treatment plants by counties, 2004



Source: CEA

*Counties and the City of Zagreb numerical indications I to XX (enlisted in the Glossary), as stipulated by the *Act on Territories of Counties, Cities and Municipalities* (OG 86/06). Data for the City of Zagreb given under No XXI

SEA AND COASTAL AREA

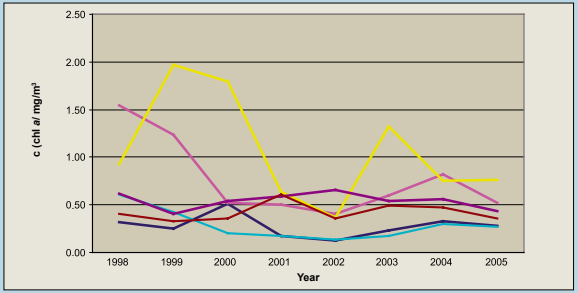
Chlorophyll *a*

Contamination caused by wastewater, stream inflows, leakage of nutrients from agricultural land and natural processes (abrasion) generates nutrients in marine waters in quantities that create an ambient favourable for intensive phytoplankton growth. Phytoplankton biomass in the sea surface layer (euphotic zone), expressed as chlorophyll a, is used for evaluation of primary production of the marine ecosystem.

Trend and current state

Data for the period between 1998 and 2005 indicate that the coastal sea is generally an olygotrophic area with low mean annual chlorophyll a concentrations (less than 1 mg/m^3). High mean annual concentrations of chlorophyll a (1–5 mg/m^3) were recorded in confined and vulnerable areas of the Kaštelanski Zaljev and Šibenski Zaljev bays (caused by municipal wastewater discharge and river inflows). Results of individual measurements were occasionally much higher. Higher mean annual values of about 1 mg/m^3 have recently been recorded in Bakarski Zaljev bay and they are attributed to the impact of groundwater with increased nutrient content. Generally, considering annual means, chlorophyll a concentration is on the decrease compared to previous years.

Mean annual concentration of chlorophyll *a* (0 - 10 m) by counties 1998-2005



	1998	1999	2000	2001	2002	2003	2004	2005
Dubrovačko neretvanska	0.32	0.25	0.51	0.17	0.13	0.23	0.33	0.28
Splitsko-dalmatinska	1.54	1.24	0.52	0.50	0.41	0.60	0.82	0.52
Šibenko-kninska	0.93	1.97	1.80	0.64	0.37	1.32	0.75	0.76
Zadarska	0.61	0.43	0.21	0.17	0.14	0.18	0.30	0.27
Primorsko-goranska	0.62	0.41	0.54	0.59	0.66	0.54	0.56	0.44
Istarska	0.40	0.33	0.36	0.61	0.36	0.49	0.47	0.36
mean	0.74	0.77	0.66	0.45	0.34	0.56	0.54	0.44

Sources: RBI-CMR Rovinj; IOF Split; IMCR Dubrovnik

SEA AND COASTAL AREA

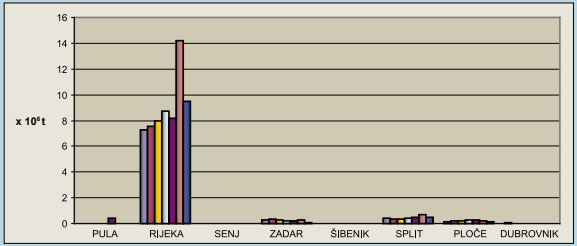
Dangerous Cargo in Sea Ports

Accidents during handling dangerous cargo (accidental spillages, leakages, etc.) may impair a limited and usually semi-confined port area. Therefore, dangerous cargo handling in sea ports is regulated by an *Ordinance*[1].

Trend and current state

During the period between 1998 and 2004, Croatian ports loaded 12.2, unloaded 58, and reloaded a total of 70.4 million tonnes of dangerous cargo. According to the reported data on total quantities of loaded/unloaded dangerous cargo by years, the Port of Rijeka is exposed to the most intensive pressure, i.e. the highest probability of sea contamination caused by handling dangerous cargo. The port loaded 11.5, unloaded almost 52, and reloaded total of 63.3 million tons of dangerous cargo, which is 90% of total dangerous cargo handled in Croatian sea ports. The data on number of accidents, clearing costs, methods of handling spilled/leaked cargo, and on available disposal sites are not recorded on a regular basis.

Quantities of dangerous cargo in the Croatian sea ports, 1998-2004



Source: MSTTD

	PULA	RIJEKA	SENJ	ZADAR	ŠIBENIK	SPLIT	PLOČE	DUBROVNIK
1998	0	7 279 901	160	243 803	108	384 010	169 735	81 937
1999	0	7 515 851	0	335 524	0	364 148	239 829	27 260
2000	0	7 949 878	2 783	293 820	0	362 482	240 331	26 993
2001	0	8 756 005	3 738	208 300	0	446 919	259 140	13 494
2002	405 000	8 171 485	8 774	186 429	245	509 945	245 465	14 448
2003	0	14 223 240	5 854	264 773	0	695 502	223 256	6 312
2004	0	9 482 610	5 477	55 198	0	509 764	164 740	2 616

[1]*Ordinance on Handling Hazardous Substances, Conditions and Methods of Transportation in Marine Transport, Loading/Unloading of Hazardous Substances, Bulk and Other Cargo in Ports, and Methods for Prevention of Oil Spills Propagation in Ports (OG 51/05)*

FISHERIES AND AQUACULTURE

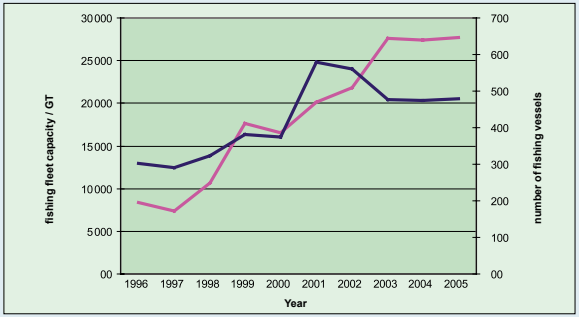
Fishing Fleet Capacity

According to the *Maritime Code*[1], fishing vessels over 12 m in length and 15 GT in capacity power belong to the fishing fleet, and they are entered into the *Fishing Fleet Registry* maintained by the Ministry of Agriculture, Forestry and Water Management. Fishing vessels under 12 m in length are referred to as fishing boats.

Trend and current state

Croatia uses 58 870 km^2 of sea for fisheries, but participation of this sector in the Croatian GDP is less than 1%. Although the number of vessels, their power and tonnage increased between 1996 and 2005, the catch did not increase accordingly. One of the reasons for this is the inadequate structure of the Croatian fishing fleet, which mostly consists of small vessels: of about 3 700 vessels in 2005, only 478 (13%) could have been classified as a fishing fleet according to the above definition.
Fishing boats, which are not suitable for deep seas, cause fishing pressure concentration on the coastal sea. For conservation of coastal habitats and reduction in fishing pressure, limitation of fishing activities in the coastal waters has been introduced as a protective measure.

Fishing fleet capacity (GT) and number of vessels, 1996 - 2005



Source: CBS, MAFWM

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
fishing fleet capacity	8 354	7 361	10 699	17 659	16 540	20 097	21 800	27 604	27 404	27 695
number of fishing vessels	302	290	323	381	375	579	560	477	475	478

[1] *Maritime Code* (OG 181/04)

FISHERIES AND AQUACULTURE

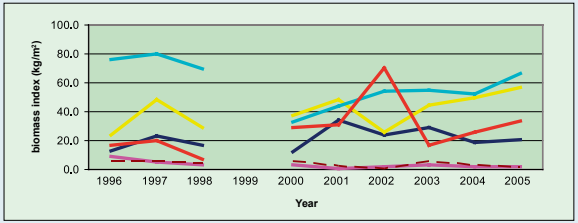
Biomass Index Trends for Economically Important Species

Biomass, an assessed quantity of organic material in a given area (e.g. the total mass of individuals within the same species per unit of area, kg/km^2), indicates the productivity of that area. The biomass index trends indicate trends in stocks of specific species.

Trend and current state

The biomass index for demersal species of maritime organisms in Croatia was on the decrease between 1996 and 2000. European hake biomass index had been on the decrease until 2000, but the situation stabilised and improved between 2000 and 2005. Red mullet and sea bream, the same as with musk poulp, show significant annual fluctuations, but no negative trend of the biomass index values has been noticed. The least favourable biomass index is that for shrimps in the deep waters of the Central Adriatic (Jabučka Kotlina), with a highly negative trend until 2001, and with a subsequent mild improvement. Such an index is a consequence of intensive fishing activities and changes in hydrogeographic conditions that play an important role in reproduction and survival of organisms in their early life.

Biomass index trend for economically important demersal species in the Croatian part of Adriatic, 1996-2005



	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
SEA BREAM	13.0	23.5	17.1		12.3	34.5	24.1	29.3	19.0	20.8
SCHRIMP	9.3	5.1	3.4		3.5	0.9	1.8	3.3	2.2	1.8
ROD MULLET	24.1	48.1	29.1		37.6	48.7	25.8	44.8	49.4	56.5
EUROPEAN HAKE	76.3	80.0	69.7		32.7	43.8	54.1	54.8	52.5	66.5
BLACK MUSK P.	16.7	19.7	7.4		28.8	31.0	70.1	17.0	25.8	33.2
WHITE MUSK P.	5.8	5.7	4.8		5.7	2.8	0.4	5.8	3.0	1.9

Source: IOF Split

WASTE

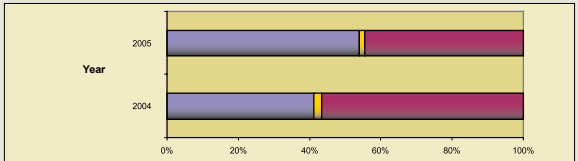
Transboundary Movement of Waste

Transboundary waste movement means import, export and transit of waste on Croatian territory. Transboundary waste movement control provides for environmental and public health protection. The transboundary movement of hazardous waste monitored in Croatia according to the strict procedures stipulated under the *Basel Convention*[1] is particularly important.

Trend and current state

Control of transboundary waste movement is stipulated by the *Regulations*[2]. Hazardous waste import is prohibited. Non-hazardous waste (for recycling purposes only) and import/transit of hazardous waste are allowed only with the permission of the Ministry of Environmental Protection, Physical Planning and Construction. There are no restrictions on the export of non-hazardous waste if an operator is issued a certificate on its entry into the *Register*. In 2005, a waste import increase was recorded because of the significant increase in import of granulated iron and steel slug, which account for 60%, while the remainder is paper and cardboard (29%), cullet and other kinds of waste imported for recycling purposes. Non-hazardous waste export volume (mainly for recycling) is also on the increase. Metal accounts for 83% of exported non-hazardous waste, the largest share being exported to Slovenia and Italy (60%). In 2005, hazardous waste export showed a slight decrease compared to 2004. The largest share of hazardous waste was exported to Slovenia (68%) and Austria, mainly lead accumulators, paints and varnishes (25%), while a smaller share went to Germany, Switzerland and other countries.

Transboundary waste movement data for 2004 and 2005



	2004	2005
non-hazardous waste export (t)	363 889	389 077
hazardous waste export (t)	14 799	13 265
hazardous waste import (t)	265 265	472 054

[1] *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (IT OG 3/94)*
[2] *Waste Act (OG 178/04); Regulation on Transboundary Waste Movement Control (OG 69/06), Regulation Amendments (OG 17/07)*

WASTE

Number of Waste Management Licenses

Type and number of waste management licenses reflect the organization and development level of a waste management system, or a segment thereof. Waste management licenses are issued for a particular waste management activity and a specific type of waste. Non-hazardous waste transport, brokerage and export companies are entered into the *Registers*.

Trend and current state

Hazardous-waste management, incineration and co-incineration licences are issued by the Ministry of Environmental Protection, Physical Planning and Construction. Licenses for management of non-hazardous and municipal waste are issued by regional authorities. Until 2005, 130 non-hazardous and municipal waste operators and 73 hazardous waste operators were issued waste management licences with an indefinite duration. Since 2005, the licences have been issued for a limited period of time (five years), and restrictions were imposed on the type of waste for which the license is granted. The number of waste management licences has shown an increase, particularly the number of licences for management of special waste categories, waste treatment, and hazardous waste. Altogether, 333 licences have been issued for non-hazardous and municipal waste management. Municipal waste operators were granted 93 licences, of which 36 were provisional. Hazardous waste management operators have been issued 49 licences, of which 39 were for waste collection and 25 for waste treatment. A number of operators are waiting for their applications to be approved. *Registers* are kept by the Ministry of Environmental Protection, Physical Planning and Construction. In 2007, 118 companies were entered in the *Register of Carriers*, 35 companies in the *Register of Brokers*, and 348 companies in the *Register of Non-Hazardous Waste Exporters*.

Type and number of waste management licences issued in 2006 and 2007

License type	Number of licences	
	May 2006	March 2007
Non-hazardous and municipal waste management licences - total	245	333
- municipal waste management licences	73	93
- collection	228	303
- treatment	59	98
(thermal treatment)	(4)	(7)
(incineration)	(1)	(1)
- recycling	22	29
- disposal	47	51
Hazardous waste management licences - total	18	49
- collection	16	39
- treatment	10	27
(thermal treatment)	(1)	(11)

Source: CEA

WASTE

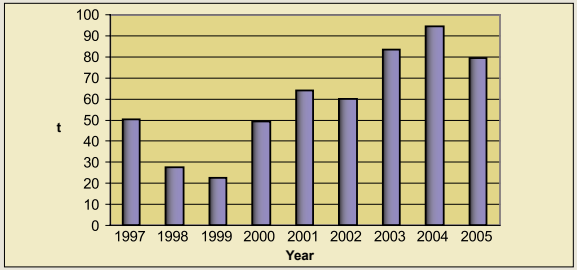
Quantity of Spent Batteries and Accumulators

Spent batteries and accumulators contain dangerous substances, such as lead, mercury, cadmium and other metals, which classifies them as hazardous waste and an environmental threat.

Trend and current state

In 2006, 1 830 tonnes of batteries and accumulators were manufactured in Croatia (only a small share of which was for the Croatian market), 10 472 tonnes imported, and 260 tonnes exported from Croatia. Annual quantity of batteries and accumulators is estimated at 12 044 tonnes (930 tonnes of batteries and 11 124 tonnes of accumulators). By 2007, some thirty companies were registered for separate collection of this type of waste, of which 17 are licensed for collection of products classified as hazardous waste. Since Croatia has no disposal capacities for this type of waste, almost the entire quantity of batteries and accumulators is exported, accounting for nearly 70% of total hazardous waste export. In 2005, 9 030 tonnes of spent batteries and accumulators were exported, of which 8 821 tonnes (98%) of lead batteries were exported for recycling in Slovenia. Until 2007, only citizens in several cities had the possibility of disposing of their batteries and accumulators separately, in special bins or recycling centres (Figure). In 2006, a new *Ordinance on Disposal of Batteries and Accumulators* (OG 133/06) was passed which regulates objectives, obligations, charges and concessions. In the early days of the *Ordinance implementation*, in 2007, eight operators were licensed for spent battery and accumulator collection.

Quantity of Spent Batteries and Accumulators colected by recycling yards in City of Zagreb, 1997-2005



year	1997	1998	1999	2000	2001	2002	2003	2004	2005
quantity (t)	50.4	27.8	22.9	49.4	64.3	60.1	83.6	94.5	79.6

Source: Čistoća d.o.o., CEA

SOIL AND AGRICULTURE

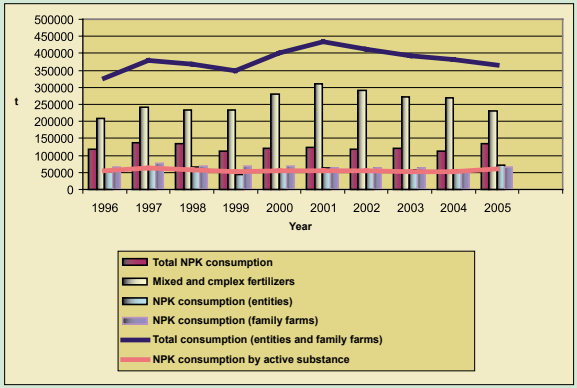
Consumption of Inorganic Fertilizers

The fertilizer consumption trend is monitored in order to determine nitrogen and phosphorous nutrient pressure on the environment. Annual consumption indicators for fertilizers and active substances have been calculated using Central Bureau of Statistics data.

Trend and current state

Compared to 1990, when a maximum consumption of 858 576 tonnes was reached, fertilizers consumption was on a permanent decrease during the post-war years. During the period between 1996 and 2005, average consumption of fertilizers was 381 010 tonnes (between 327 557 and 434 595 tonnes). Consumption of active substances was between 50 833 and 62 460 tonnes. According to the latest *Agricultural Directory* (2003), the maximum consumption of fertilizers was recorded in Osječko-Baranjska County (81 830 tonnes), and the minimum in Šibensko-Kninska (2 545 tonnes). However, considering fertilization of an agricultural land unit, the highest consumption was recorded in Vukovarsko-Srijemska County (476 kg/ha), and the lowest in Primorsko-Goranska County (6 kg/ha).

Consumption of inorganic fertilisers, 1996-2005



Source: 2006 Statistical Yearbook

SOIL AND AGRICULTURE

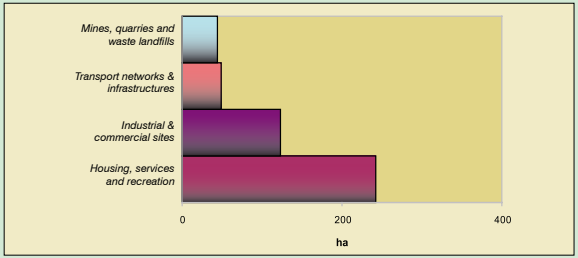
Land Take

Land take indicators show land use change by ground sealing using impermeable materials, which potentially causes reduction in soil permeability (compaction) and contributes to fragmentation of habitats.

Trend and current state

According to indicators calculated using the *LEAC Methodology (ETC/TE)*, land take by artificial development was 4 587 ha (459 ha per year) during the period between 1990 and 2000.
The main driver of land uptake by artificial development, with 2 424 ha, is the building of housing, services and recreational facilities. The second driver of increase in urban and other artificial areas is sprawl of industrial and commercial sites, with 1 230 ha of permanent land uptake. Development of transport networks, and mines and quarrying areas is responsible for a land take of 933 ha.

Main land take drivers and annual rates (ha/year), 1990-2000



Source: CEA

Total area of land taken by roads, 2006

Description	Width (m)	Length (km)	Area (ha)
Highway	25.00	1 070	2 675
Semi highway	12.5	176	220
State road	6	6 435	3 861
County road	5	10 096	5 048
Local road	4.2	13 395	5 625
Unclassified	4.2	11 990	5 035
Total			22 466

SOIL AND AGRICULTURE

Contaminated Sites

Local contamination occurs in intensive industrial activity areas, inadequate landfills, mineral extraction sites, and military areas, or as a result of different accidents which might cause deposition/ingress of pollutant onto/into the ground.

Trend and current state

Based on available data, there were 1 151 potentially contaminated sites in 2005, of which 38 contaminated locations were declared positive. These are generally landfills, industrial sites and power generation facilities (black spots). Most contamination cases are related to accidents such as oil pipeline failures, traffic accidents, etc. Between 2002 and 2005, an average of 35 traffic accidents were recorded which resulted in oil spillages and spilling of other harmful substances. Of eleven black spots recorded in 2005, two were remediated (Plomin, Ina Vinil), and one is under remediation (Bakar Coke Plant). It is assumed that the number of potentially contaminated sites is not final and actually contaminated sites number and locations are yet to be determined.

Black spots

Source: CEA

SOIL AND AGRICULTURE

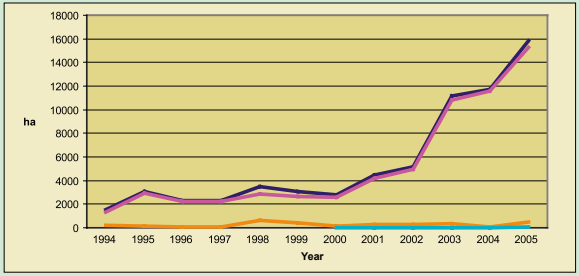
Water Consumption for Irrigation

Data on increase/decrease in irrigated land area or data on cultivated land which is commonly irrigated, enable total agricultural land pressure on water resources to be evaluated.

Trend and current state

The Croatian hydro potential is exceptionally high, but quantities of water used for agriculture are very low (2% of abstracted water). It is estimated that, realistically, about 100 000 ha of land is to be irrigated in Croatia (NAPNAV 2005). According to the data from the 2003 *Agricultural Census*, 9 264 ha of land were under irrigation, of which 54% were on family farms (most of them in Splitsko-Dalmatinska and Dubrovačko-Neretvanska County). The most irrigated land owned by agribusinesses was recorded in Osječko-Baranjska County. The *2003 Statistical Yearbook* refers to 11 175 ha of irrigated land, which is an indication that improvements in methodology are necessary.
For data monitoring consistency, data from the *2006 Statistical Yearbook* are used in the diagram.

Land irrigation, 1994-2005



Source: 2006 Annual Yearbook

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005
Total	1 554	3 046	2 291	2 326	3 483	3 095	2 786	4 481	5 138	11 175	11 697	15 824
Sprinkler	1 319	2 932	2 244	2 252	2 862	2 644	2 612	4 153	4 936	10 801	11 596	15 277
Suface	235	114	47	74	621	451	171	307	255	355	74	488
Drip							3	21	19	19	27	59

BIODIVERSITY

Designated Areas in Croatia

Designated areas contribute to the preservation of biological and landscape diversity, particularly of rare and endangered species. Designated areas also contribute to preservation of habitats and geological heritage in their original form.

Trend and current state

Currently, 447 locations in Croatia are under some form of protection. According to the *Nature Protection Act*[1], designated areas are classified under nine categories: strict reserve (2); national park (8), special reserve (78), nature park (11), regional park (0), natural monument (104), important landscape (71), park forest (38), and monument of park architecture (135). Some of these sites, including Plitvice Lakes and Mt. Velebit, are under international protection by UNESCO or placed on the RAMSAR List (Lonjsko Polje and Kopački Rit, Crna Mlaka Fish Ponds, the Neretva River Delta). At its session on 29 September 2006, the Croatian Parliament declared the Island of Lastovo and the Lastovo Archipelago the eleventh Croatian nature park. Thus, in 2006, the designated area increased by 19.5 ha, and now covers total land area of 532 064 ha.

Designated areas in Croatia by categories

Category	Number	Land area (ha)
Strict reserve	2	2 395
National park	8	93 181
Special reserve	78	27 797
Nature park	11	325 447
Regional park	0	0
Natural monument	104	763
Important landscape	71	72 467
Forest park	38	9 052
Monument of park architecture	135	962
TOTAL	447	532 064

Source: Ministry of Culture - Designated Areas Register

[1] *Nature Protection Act (OG 70/05)*

BIODIVERSITY

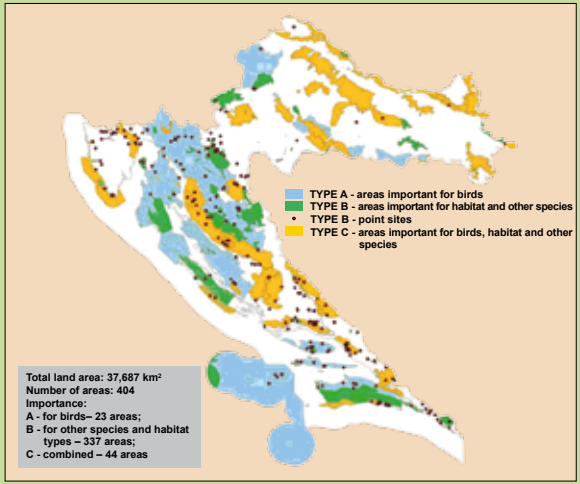
Ecological Networks in Croatia

An ecological network is a system that includes sites important for conservation of wildlife and habitats. The selected sites are cross-connected by a system of corridors that enable migration of animals and communication with remote parts of their habitats

Trend and current state

All EU member states have to set up a Natura 2000 Network pursuant to the EU directives, i.e. *Birds Directive and Habitats directive*. The accession countries, namely all the parties to the *Bern Convention on the Conservation of European Wildlife and Natural Habitats*, have an obligation to set up an *Emerald Network*, which is an equivalent of *Natura 2000*. Croatia determined 23 *Emerald* sites for birds, 337 sites important for wildlife and habitats, and 44 combined sites. In addition to the *Emerald Network*, Croatia has been developing a more detailed system of the *National Ecological Network* that will encompass all important habitats and species. The ecological network sites are sites where special biodiversity protection and conservation measures are to be imposed and monitoring implemented.

Emerald Network areas



Source: SINP

BIODIVERSITY

Diversity and Endemic Species

Croatia has a very high biodiversity index, i.e. number of species per unit of area (km^2). A large number of endemic species has been recorded.

Trend and current state

Richness in species is a result of specific geographical position and climate, geomorphologic and hidrogeographic conditions, which enable the creation of a wide range of habitats. Unfortunately, there is still no comprehensive inventory of species diversity, and a monitoring system has not been implemented in all designated areas. According to the *Nature Protection Act*[1], strictly protected species comprise 809 plant taxa, while protected species include 331 taxa. Over the past five years, 198 new taxa of terrestrial invertebrates, 146 taxa of freshwater invertebrates and 20 taxa of marine invertebrates have been registered in Croatia.

Diversity and endemic species

	Known species	Endemic species
Vascular flora	8 582	485
Fungi	3 800	0
Lichens	903	82
Mammals	101	5
Birds	1 410	0
Reptiles	38	9
Amphibians	20	6
Fresh water fish	150	18
Marine fish	433	6
Terrestrial invertebrates	15 474	351
Fresh water invertebrates	1 780	172
Marine invertebrates	5 647	1
Total	38 338	1 135

Source: SINP

[1] *Nature Protection Act (OG 70/05)*

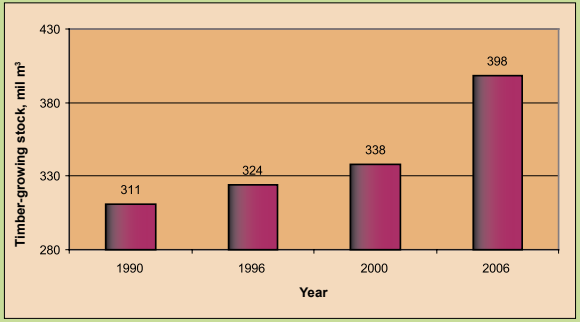
FORESTRY
Forest Areas, Timber-Growing Stock and Wood Stock Increment

Sustainable management of forest resources is confirmed by maintaining a positive balance between wood stock increment and total timber-growth stock, and annual allowable cut. Croatia has been recording a stable wood stock increment trend.

Trend and current state

According to the latest *Forest Management Scheme for the Period* 2005-2015, published in 2007, forests and forest land in Croatia occupy an area of 26 887 km^2, which is almost 47% of Croatia's inland territory. The forests cover an area of 24 028 km^2. Forest area today is by 2 031 km^2 larger than the surface area under forests recorded in Croatia in 1996. The reason for this change is succession, more precisely the return of forest species to abandoned agricultural land and pastures. Increase in forest areas results in a noticeable and steady trend in wood stock increment. Compared to the timber-growing stock of 324 million m^3 recorded in 1996, the 2006 timber-growing stock increased by 74 million m^3. Total timber-growing stock in 2006 was 398 million m^3.

Timber-growing stock, 1990-2006



Source: Forest Management Scheme for the Period 2005-2015

FORESTRY

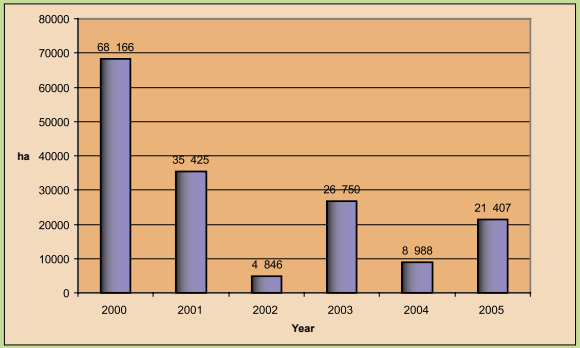
Fire-affected Areas

Fires cause numerous ecological changes: loss of habitats, decrease in biodiversity, and increased risk of erosion and groundwater contamination due to loss of topsoil.

Trend and current state

Fires mainly break out along the forest-covered coastal and island areas with dominant vulnerable pioneering vegetation and different degraded forest forms, such as maquis and garigue. Forests fires adversely affect both nature and the local population, which depends on forest resources for survival. The coastal forest areas are often in the vicinity of tourist resorts, which increases fire risks. The highest number of forest fires (590) was recorded in 2000, when 68 166 ha of area were affected by fires. Croatia is undertaking necessary steps to improve methods for fire detection and prevention by investing into infrastructure and equipment, which has already resulted in a decrease in number of fires. It is certainly necessary to engage more intensively in raising awareness among the general public and tourists about fire risks, since the fires are most frequently started by people.

Fire-affected areas, 2000-2005



Source: MAFWM

PUBLIC RELATIONS

Number and Breakdown of Public Inquiries Addressed to the Croatian Environment Agency

Pursuant to the Croatian regulations that provide for public access to environmental information, the Croatian Environment Agency has been honouring its obligation to publish information by posting it on the Agency web site and by publishing an *Information Catalogue*.

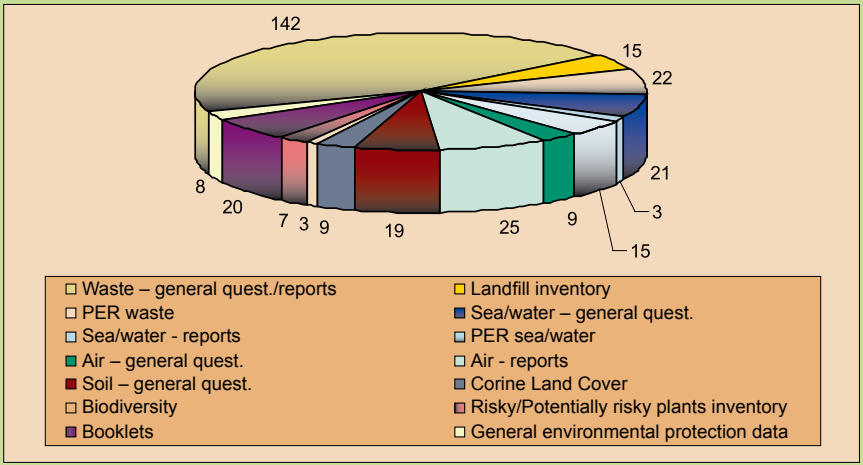
Trend and current state

In 2006, the Agency received 138 requests asking for 318 items of information and data. The most common were requests for data on waste (56%) which has been holding the top position among environmental topics. Three other large themes covered by the Agency were equally interesting for the public: requests on sea and water data accounted for 12%, on air for 11%, and on soil for 9% of all inquiries, while the lowest interest was shown for biodiversity (1%). Editions prepared for general public were requested in 6% and general environmental data in 5% of cases. Comparison of applicants reveals that most requests (34%) were submitted by private companies wishing to start or which had already started their business in some of waste collection and/or treatment activities. The general population is highly aware of environmental issues, as confirmed by 24% of requests emanating from the general public. Since the number of inquiries from the general public during the first six months of 2006 was only 4%, its increase by several times in the second half of the year should be noted. The professional public frequently asked for a more detailed insight into information posted on the web site, and 12% of requests submitted by the scientific community was most frequently used in research studies and for development of plans and strategies. The state administration submitted these data in the form of reports the Agency prepares pursuant to legal provisions. Therefore, the number of requests for additional data received from these bodies is comparatively small (8%). Local self-government units, on the other hand, submitted requests (6%) which commonly asked for data needed for development of strategic documents which they are obliged to prepare. Public institutions submitted 5% of all requests, the same as foreign institutions (embassies and the World Bank). The bottom of this scale is reserved for state-owned enterprises and NGOs which asked for information in an equal share (3% of total requests). According to experience the Agency has had so far, the number of inquires from all public sectors shows a steadily increasing trend, which corresponds with the general trend of increase in interest for environmental topics.

PUBLIC RELATIONS

Number and Breakdown of Public Inquiries Addressed to the Croatian Environment Agency

Breakdown of public inquiries addresed to CEA in 2006



Source: CEA

THE ENVIRONMENT IN YOUR POCKET

ACRONYMS AND ABBREVIATIONS

CEA	– Croatian Environment Agency
CO	– carbon monoxide
CO_2	– carbon dioxide
CBS	– Central Bureau of Statistics
CNIPH	– Croatian National Institute of Public Health
DIOX	– dioxins and furans
ETC/TE	– European Topic Centre on Terrestrial Environment
GNP	– Gross National Product
GT	– gross tonnage (total vessel capacity)
N_2S	– nitrous sulphide
HEP	– Hrvatska Elektroprivreda (Croatian Power Company)
HPEI	– Hrvoje Požar Energy Institute
IMCR	– Institute for Marine and Coastal Research
IOF	– Institute of Oceanography and Fisheries, Split
I-TEQ	– International Toxic Equivalent
LEAC	– Land & Ecosystems Account
LRTAP	– Long-Range Transboundary Air Pollution
MAFWM	– Ministry of Agriculture, Forestry, and Water Management
MELE	– Ministry of the Economy, Labour and Entrepreneurship
MEPPPC	– Ministry of Environmental Protection, Physical Planning, and Construction
MSTTD	– Ministry of Maritime Affairs, Tourism, Transport and Development

THE ENVIRONMENT IN YOUR POCKET

ACRONYMS AND ABBREVIATION

NAPNAV 2005 – National Project for Irrigation and Agricultural Land and Water Management for the Republic of Croatia, MAFWM, 2005

NOx – nitrogen oxides

NPK – fertilizer (nitrogen, phosphorus, potassium)

PER – Pollutant Emission Register

PAH – polycyclic aromatic hydrocarbons

$PM_{2.5}$ – particulate matter less than 2.5 μm in diameter

PM_{10} – particulate matter less than 10 μm in diameter

RBI-CMR – Ruđer Bošković Institute, Centre for Marine Research, Rovinj

SINP – State Institute for Nature Protection

SO_2 – sulphur dioxide

TSP – total suspended particles

THE ENVIRONMENT IN YOUR POCKET

Glossary

Abrasion – Destruction caused by marine and lacustrine waves that cave in and erode the coast.

Accident – An unintentional, unexpected event with the potential for harming human life, property or the environment.

Annual felling – allowed timber-growing stock cut in cubic meters.

Biological diversity – Overall diversity of life on Earth, which encompasses genetic (variation within species), species, and ecosystem (habitat) diversity.

Mediator – Physical or legal person which organizes waste recovery and/or disposal on behalf of other parties.

Co-incineration – The process of waste incineration whose main purpose is production of energy or material products and which uses waste as regular or additional fuel and waste treatment for final disposal.

Demersal species – Marine organisms that live on, or in close proximity to, the seabed or depend on it.

Ecological network – A system of sites and corridors of particular importance for survival of plant and animal species, migration and conservation of natural habitats and landscapes. The best known European ecological network is Natura 2000 founded pursuant to the *Habitats Directive and Birds Directive*.

Emerald Network - System that includes sites important for conservation of wildlife and habitats. An equivalent to **Natura 2000** and intended for non-EU member states.

Endemic species - Species native to, and restricted to, a particular type of habitat.

Erosion – Natural physical process in which soil is removed by wind, rain or due to lack of vegetation.

Euphotic zone – The upper, illuminated zone (water column) in seas, oceans and terrestrial standing waters and zone of effective photosynthesis.

Forest Management Scheme –The basic plan (program) for forest and forest land management in an economic unit or region prepared on a ten-year basis. It stipulates forest

environmental protection requirements, allows felling, and numerous other parameters important for sustainable forest management.

Hazardous waste – Waste determined by categories and composition which has one or more of characteristics (e.g. explosive, flammable, toxic characteristics) stipulated in the Hazardous Waste *List under the Regulation on Categories, Types and Classification of Waste with Waste Catalogue and Hazardous Waste*, OG 50/05.

Monitoring – Observing the state of the environment.

Non-industrial combustion plants – Small-sized combustion plants burning fuel for production of heat, such as combustion plants in crafts, institutions, households, agriculture, forestry and aquaculture. This sector includes production of heat and power for own use.

Oligotrophic sea – Based on the eutrophication degree, coastal sea is classified as oligotrophic, mezotrophic, eutrophic, and extremely eutrophic. An oligotrophic sea is in a very good ecological state and of the highest quality, with low concentration of nutrients, low productivity, low turbidity, colourless, and with no hypoxia.

Phytoplankton – Microscopic organisms that live in a water column and float in it carried by currents and waves.

Pioneer species – Resistant, mainly woody plants used for forestation of extremely degraded habitats, particularly karst and macquis, and to prepare habitats and improve conditions for succession of other vegetation or return of indigenous vegetation.

Point sites – Strictly localized sites (e.g. for protection of a rare species, tree or cave, cultural or natural monument) as opposed to larger areas (e.g. nature park or national park) which are defined by polygons, i.e. greater distribution area.

Primary production – Production of new organic matter from inorganic compounds by photosynthesis or chemosynthesis.

Ramsar – A town in Iran in which *The Convention on Wetlands of International Importance* was adopted in 1971. Croatia proclaimed four Ramsar sites.

Recycling – Reuse of waste in the production process, but not including the use of waste for energy purposes.

Recycling centre - Facility intended as a sorting facility and transfer station for special types of waste (Article 1, *The Act Amending the Waste Act* OG 111/06).

Remediation – Measures and/or activities aimed at reinstating, and compensating for, conditions in the environment prior to damage or contamination.

Renewable energy sources – Energy sources not depleted in energy production, including hydropower, solar energy, wind energy.

Repopulation – Furnishing with a species anew.

Separate collection at source – Separate collection of waste in curb-side schemes or recycling centres.

Special categories of waste – Packaging and packaging waste, waste electrical and electronic equipment, waste tyres, end-of-life vehicles, spent batteries and accumulators, infectious waste from hospitals, mining and quarrying waste, spent oils, titanium dioxide industry waste, PCBs and PCTs (Article 33, para. 1, *The Act Amending the Waste Act* OG 111/06).

Stock – individuals of the same species (with common genetic material) occupying a particular geographical area which rarely mix with individuals from other areas.

UNESCO – A specialized UN organization for intellectual and ethical issues in education, science and culture. UNESCO sites are of international importance.

Vascular flora – Terrestrial flora of the following groups: aspidium, gymnosperm, and angiosperm.

Waste management - A set of activities, decisions and measures aimed at preventing the generation of waste, reducing the quantity of waste and/or its adverse effects on the environment, performing collection, transportation, recovery, disposal and other activities related to waste, as well as supervision of these activities, and after-care for closed down landfills. (Article 4, *Waste Act,* OG 178/04).

Waste recovery - The reprocessing of waste in order for

it to be used for material and energy purposes (Article 3, para. 9, *Waste Act*, OG 178/04).

Waste treatment - Biological, thermal, or physico-chemical processes and waste disposal procedures pursuant to Article 4, *Waste Management Ordinance*, OG 32/07.

Wastewater Treatment Plants Catalogue – List of wastewater treatment plants according to the *Ordinance on Pollutant Emission Register* (OG 36/99), including mechanical, chemical, biological plants and heat exchangers.

Regional organization of the Republic of Croatia - Counties - Numerical identification and regional organization stipulated by the *Act of Territories of Counties, Cities, Towns and Municipalities in the Republic of Croatia* (OG 86/06):

I Zagrebačka County based in the City of Zagreb,
II Krapinsko-Zagorska County based in Krapina
III Sisačko-Moslavačka County based in Sisak
IV Karlovačka County based in Karlovac
V Varaždinska County based in Varaždin
VI Koprivničko-Križevačka County based in Koprivnica
VII Bjelovarsko-Bilogorska County based in Bjelovar
VIII Primorsko-Goranska County based in Rijeka
IX Ličko-Senjska County based in Gospić
X Virovitičko-Podravska County based in Virovitica
XI Požeško-Slavonska County based in Požega
XII Brodsko-Posavska County based in Slavonski Brod
XIII Zadarska County based in Zadar
XIV Osječko-Baranjska County based in Osijek
XV Šibensko-Kninska County based in Šibenik
XVI Vukovarsko-Srijemska County based in Vukovar
XVII Splitsko-Dalmatinska County based in Split
XVIII Istarska County based in Pazin
XIX Dubrovačko-Neretvanska County based in Dubrovnik
XX Međimurska County based in Čakovec
XXI City of Zagreb: identification selected for data presentation

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