

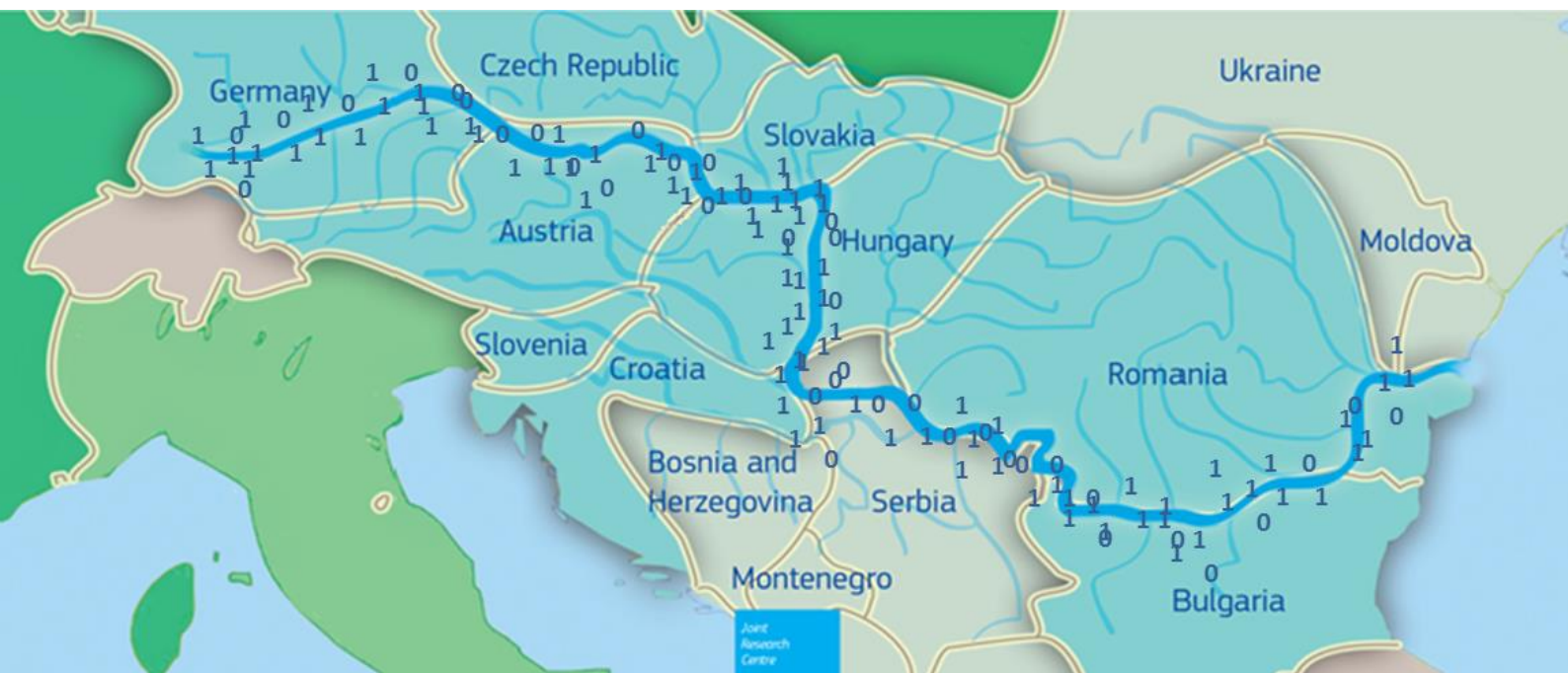
Danube Reference Data and Services Infrastructure

Danube_Net (D1)

State-of-play and organisational context of data infrastructure in Republic of Croatia

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1 Introduction

The State-of-play addresses current position and accomplishments of Republic of Croatia regarding data infrastructure in general. The task is to identify key players of data infrastructure building, to outline current organisation, policies, types of data, legislative regarding data infrastructure, and to estimate possibility for building Danube Referenced Data and Service Infrastructure (DRDSI) in Croatia.

Croatia is a new member state of European Union, since 1 July 2013, therefore there are still some problems in transposing European legislative to national laws. There is no regulation on data infrastructure in general, but national spatial data infrastructure is regulated through INSPIRE directive (Infrastructure for Spatial Information in European Community, Directive 2007/2/EC of European Parliament and of the Council). The transposition of INSPIRE Directive has been made through the Law on National Spatial Data Infrastructure (NSDI)¹. This is the leading point for activities in establishment of data infrastructure in Croatia, besides the fact that directive addresses spatial data. Croatia is the leader in Western Balkan region in adopting regulations and obligations regarding INSPIRE directive. The National contact point for INSPIRE is State Geodetic Administration (SGA). NSDI, geoinformatics and spatial data management is mostly under scope of geodesy in Croatia, although other professions are working on training, practicing and fulfilling their needs in this area, and participating in NSDI building.

Croatia is also part of the Danube Region. The national contact point for Danube Region Strategy (EUSDR) in Croatia is Ministry of Foreign and European Affairs. Within Danube Region Strategy, there are 11 Priority Areas:

- PA1A Mobility – Waterways
- PA1B Mobility – Rail-road-air
- PA2 Energy
- PA3 Culture & Tourism
- PA4 Water Quality
- PA5 Environmental Risks
- PA6 Biodiversity, landscapes, quality of air and soil
- PA7 Knowledge Society
- PA8 Competitiveness
- PA9 People & Skills
- PA10 Institutional capacity and cooperation
- PA11 Security

Croatia is coordinating PA6 together with Bavaria (Germany) and PA8 together with Baden Württemberg (Germany).

The DRDSI project was proposed as one of the flagship actions of *Priority Area 07 "To develop the Knowledge Society (research, education and ICT)"* of the EUSDR and is mentioned in the Roadmap for the implementation of this Priority Area. PA7 is coordinated by Slovakia and Serbia. DRDSI project was launched by EC Joint Research Centre (JRC) with the support of scientific partners of the Danube countries with aim to develop a Danube Data and Services Infrastructure that will facilitate access to comparable and harmonised data sets on various issues related to the Danube Region. Thanks to its cross-cutting nature, this Infrastructure will contribute to the holistic scientific approach needed to tackle the interrelated and interdependent challenges which the Danube Region is facing.

The Scientific support to the Danube Strategy will directly or indirectly contribute on:

¹ Law on National Spatial Data Infrastructure, http://narodne-novine.nn.hr/clanci/sluzbeni/2013_05_56_1135.html

- Waterways (PA1a)
- Energy (PA2)
- Water Quality (PA4)
- Environmental Risks (PA5)
- Biodiversity, landscapes, quality of air and soils (PA6)
- Knowledge Society and ICT (PA7) and
- Competitiveness (PA8).

There are 4 thematic flagship clusters:

- Danube Water Nexus (DWN)
- Danube Land and Soil Nexus (DLSN)
- Danube Air Nexus (DAN)
- Danube Bio-energy Nexus (DBN)

and 3 horizontal activities:

- Danube Reference Data and Service Infrastructure (DRDSI)
- Smart Specialisation in the Danube Region
- Danube Innovation Partnership (DIP).

When considering DRDSI, it should encompass non-spatial data as well. Besides INSPIRE directive which is transposed into national legislation, there are some other laws and rulebooks defining obligations for different registers and access to public sector data. The most important are Law on Right to Access Information² (transposition of PSI Directive) and Law on State Information Infrastructure³. Based on that, various organisations are keeping their registers under the scope of NSDI, and these data are going to be incorporated in this document as well. So, DRDSI is infrastructure developed in parallel with INSPIRE infrastructure and is reusing INSPIRE principles. While INSPIRE is all about spatial data it is expected that DRDSI infrastructure in Croatia should be more comprehensive because it includes non-spatial data and services as well. Confirmation of this is fact that, in DRDSI is anticipated to include every organisation which deals with Danube Region referenced data and services, not just limited list of mandatory organisations as INSPIRE defines as NSDI subjects. In Croatia there is extensive list of non-governmental organisations (NGOs). They are mostly not spatially oriented, but managing and using standard ICT tools when keeping different registers. Therefore, it could be expected that there will be some NGO's but also some private sector organisations in Data Inventory that have no direct relation to INSPIRE.

This document distinguishes key actors as data providers, policy-making organisations, research organisations and other stakeholders. For each of these categories, an overview and analysis of structure of organisations classified in category is given. Also, estimation of readiness for involvement in DRDSI building is given for each category. Finally, conclusion addresses overall estimation of state-of-play in Republic of Croatia, and recommendation on how to proceed with identified key players in Danube Reference Data and Service Infrastructure.

² Law on Right to Access Information, http://narodne-novine.nn.hr/clanci/sluzbeni/2013_02_25_403.html

³ Law on State Information Infrastructure, http://narodne-novine.nn.hr/clanci/sluzbeni/2014_07_92_1840.html

2 Data providers

The key data provider in Croatia is a State Geodetic Administration (SGA)⁴. The SGA is a State administrative organisation dealing with administrative and professional tasks in the field of geodesy, geoinformatics, relatively more precise State surveys, cartography, real estate cadastre, spatial units register and spatial data infrastructure. It also takes care about the geodetic profession. The Ministry of Construction and Physical Planning represents the SGA in the Government of the Republic of Croatia. The SGA is organised as having the Central office located in Zagreb and Regional Offices for cadastral systems. Since 2007, SGA has been coordination body for NSDI establishment and nowadays NCP for INSPIRE Directive.

Spatial data themes defined in Inspire Annexes I and II (reference data) are in Croatia mostly under responsibility of the SGA (Coordinate reference systems, Geographical grid systems, Geographical names, Administrative units, Addresses, Cadastral parcels, Elevation and Orthoimagery). Some spatial objects of data themes, for example transport networks and hydrography are available in SGA as well as in other responsible institutions (Croatian Hydrographic Institute, Croatian Motorways, ...). The majority of SGA's Data are available for viewing and downloading through SGA Geoportal⁵.

In September 2014. NSDI geoportal on national level has been officially launched (Figure 1).

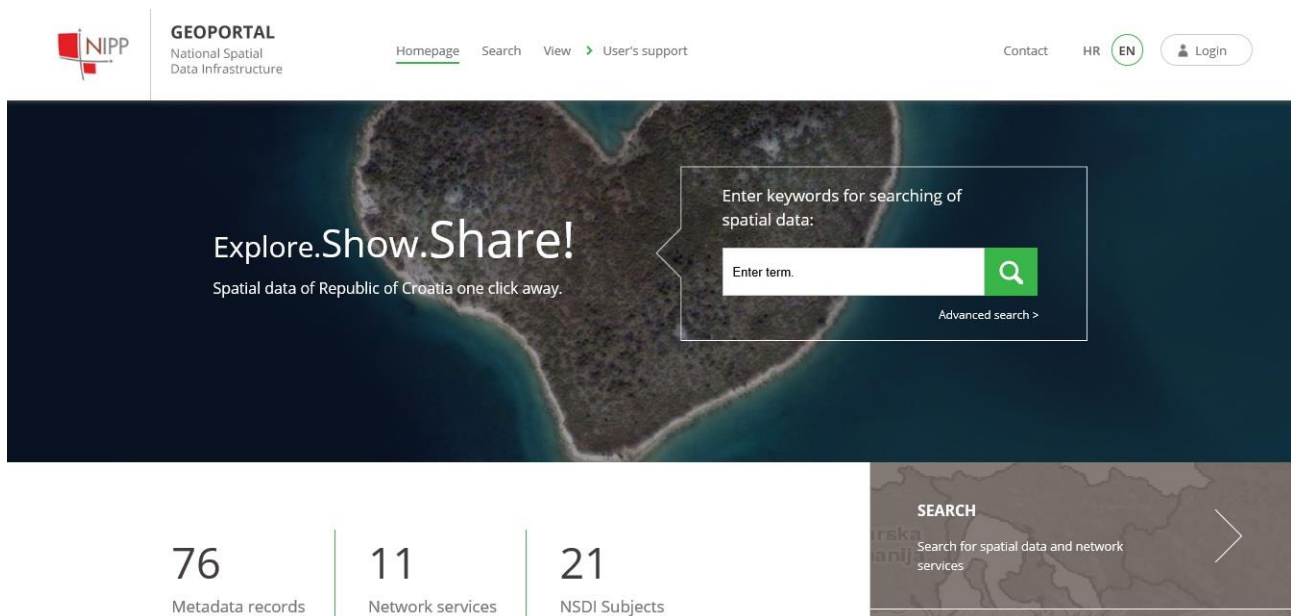


Figure 1. NSDI geoportal⁶

NSDI geoportal is currently supporting: discovery, view, download and coordinate transformation services and provides following resource types: Dataset(54), Series(21) and Service(14). However this numbers will change. NSDI geoportal is established, maintained and developed by the National Contact Point (SGA) for the purpose of managing the metadata and providing the services of discovery, view, download, transformation and invoke the spatial data resources as well as other information regarding the NSDI.

⁴ State Geodetic Administration, <http://www.dgu.hr>

⁵ State Geodetic Administration Geoportal, <http://geoportal.dgu.hr/>

⁶ NSDI geoportal, <http://geoportal.nipp.hr/>

The second key data provider is Croatian Environment Agency (CEA).⁷ CEA is an independent public institution established by a decision of the government of the Republic of Croatia to collect, integrate, and process environmental data. CEA collects and analyses data on the state of the environment components (air, water, sea, soil), and data on environmental pressures (pollutant emissions, quantities of detrimental substances by polluter, quantities and types of waste, waste management practices, etc.). CEA is also responsible for set up of Environmental Information System (EIS). EIS is set up as a series of interconnected electronic databases, applications and data sources on the state of and pressures on individual environmental components, on environmental pressures and spatial characteristics, and other data and information important for the environmental monitoring at the national and European level. It currently includes 63 databases on 11 sub-systems. The EIS is aimed to improve collecting, management, exchange and use of the environmental data in Croatia as well as international exchange of data and information through collaboration with the European Environment Agency (EEA) in line with the requirements of the European Information and Observation Network (EIONET).

List of Data providers is given in Table 1.

Table 1. Data providers

Name	Classification	Typical types of data provided	Willingness/readiness to provide data users new data on request
State geodetic administration	Government	Co-ordinate reference systems Geographical names Administrative units Addresses Cadastral parcels Elevation Orthoimagery Land cover	N/A
Ministry of construction and physical planning	Government	Land use	N/A
Ministry of Economy	Government	Production and industrial facilities Energy resources	N/A

⁷ Croatian Environment Agency, <http://www.azo.hr/>

Ministry of Defence	Government	Military information	N/A
Ministry of maritime affairs, transport and infrastructure	Government	Utility and government services Transport networks Sea regions	N/A
Croatian bureau of statistics	Public Institution	Statistical units	N/A
State Institute for Nature Protection	Public Institution	Protected sites Habitats and biotopes Bio-geographical regions	N/A
Croatian Environment Agency	Public Institution	Environmental monitoring facilities	N/A
Ministry of Culture	Government	Protected sites Cultural Heritage	N/A
Paying agency for agriculture, fisheries and rural development	Public Institution	Land use	N/A
Croatian post and electronic communications agency	Public Institution	Utility and government services	N/A
Croatian geological survey	Public Institution	Geology	N/A
Hydrographic Institute	Public Institution	Hydrography Elevation	N/A

City of Zagreb	Local self-government	Orthoimagery City map Land cover	N/A
City of Koprivnica	Local self-government	Orthoimagery City map	N/A
City of Novska	Local self-government	Orthoimagery City map	N/A
Meteorological and hydrological Service	Public Institution	Atmospheric conditions and meteorological geographical features Oceanographic geographical features	N/A
Croatian Forests Ltd.	Public company	Land cover Forest units	N/A
Novokom Ltd.	Private company	Utility and government services	N/A
Croatia Roads Ltd.	Public Company	Transport networks	N/A
Inland Navigation Development Centre Ltd.	Private company	Transport networks	N/A
Croatian Telekom Inc.	Private company	Utility and government services	N/A
Ministry of Entrepreneurship and Crafts	Government	Production and industrial facilities	N/A

Croatian Real Estate Agency	Public Institution	Buildings	N/A
Croatian Chamber of Trades and Crafts	Public Institution	Production and industrial facilities	N/A
Office for State Property Management	Public Institution	Buildings	N/A
Association BIOM	NGO	Protected sites	N/A
Croatian Waters	Public Institution	Hydrography	N/A
GDi GISDATA	Private company	Spatial data services	N/A
Croatian State Archives	Public institution	Alphanumerical data	N/A
Croatian Mine Action Center	Public institution	Mine suspected areas	N/A
Croatian Autoclub	NGO	Transport networks	N/A
Croatian Forest Research Institute	Public institution	Land cover Habitats and biotopes)	N/A

Agency for agriculture land parcels	Public institution	Soil	N/A
Faculty of agriculture in Osijek	University	Agricultural and aquaculture facilities Soil	N/A
HEP Production Ltd	Public company	Energy resources Production and industrial facilities	N/A
City of Varazdin	Local self-government	Orthoimagery City map Buildings	N/A
City of Karlovac	Local self-government	Orthoimagery City map	N/A
City of Kutina	Local self-government	Orthoimagery City map	N/A
City of Ivanić Grad	Local self-government	Orthoimagery City map	N/A
City of Sveta Nedelja	Local self-government	Orthoimagery City map	N/A
Croatian Railway Infrastructure	Public company	Transport networks	N/A

Key data providers are in the majority public authorities (Ministries etc.). The content of data that they are providing very well support EUSDR. In the most cases data are only available for viewing and in some cases OGC WMS services are available. Free data download, in general, is not supported. In some cases download services exists but in general access to data must be coordinated with data provider's contact point. In some cases data can be free of charge (e.g. city of Zagreb) and in some cases data are charged according to

specific rules on pricing policy (e.g. State Geodetic Administration). In general, willingness/readiness to provide data users new data on request is not known in the moment and must be further investigated and communicated on individual basis, case by case.

3 Policy-making organisations

Croatia is coordinating PA6 together with Bavaria (Germany) and PA8 together with Baden Württemberg (Germany). PA6 aims to preserve biodiversity, landscape and the quality of air and soils. PA8 aims to support the competitiveness of enterprises, including cluster development in EU Member States and 6 pre-accession countries. The thematic interest in Croatia focuses on competitiveness and enterprises priority (driven by the Ministry of Economy) and on environment and more concretely on biodiversity (driven by the Ministry of Environmental and Nature Protection). Croatia has in the same time in education and innovation related topics and is very active in promoting academic networks and innovation clustering in the region.

Key stakeholders are:

- National Contact Point
 - Mr Hrvoje Marušić, Director General, Ministry of Foreign and European Affairs *hrvoje.marusic@mvep.hr*
- Priority Area Coordinators:
 - Biodiversity priority Ms Kornelija Pintaric, Ministry of Culture Directorate for Nature Protection, *kornelija.pintaric@min-kulture.hr*
 - Competitiveness of enterprises priority, Mrs Dragica Karaić, Ministry of Economy, Labour and Entrepreneurship, *dragica.karaic@mingorp.hr*

The Government, the main executive power of the Croatian state, is headed by the prime minister. There are 20 other government members, serving as deputy prime ministers, government ministers or both; they are chosen by the prime minister and confirmed by the Parliament. The government ministers are each in charge of a particular sector and related policy making.

Table 2. Ministries and policy areas

Name	Classification	Policy areas	Completed and current projects creating data or tools to support the EU Strategy for the Danube Region
Ministry of economy	Central government	Energy Industry Trade Mining	Renewable Energy Sources http://oie-aplikacije.mingo.hr/InteraktivnaKarta/ Mineral Resources
Ministry of Social Policy and Youth	Central government	Social Youth Humanitarian aid	
Ministry of Regional Development and EU Funds	Central government	Regional development	Map of Utility project in cities/municipalities http://www.mrrfeu.hr/maps/

Ministry of Finance	Central government	Fiscal	
Ministry of Defence	Central government	Defence	
Ministry of Foreign and European Affairs	Central government	Foreign relations	
Ministry of Interior	Central government	Interior	
Ministry of justice	Central government	Justice and Law	Joint information system (Cadastre and land registry) <i>www.uredjenazemlja.hr</i>
Ministry of Public Administration	Central government	Public Administration	
Ministry of Entrepreneurship and Crafts	Central government	SME Trade Investments	SMEPASS2 <i>http://www.smepass2.eu/</i> Guidelines for SMEs <i>http://poticaji.minpo.hr/</i>
Ministry of Labour and Pension System	Central government	Labour Pensions	
Ministry of maritime affairs, transport and infrastructure	Central government	Transport Infrastructure Sea	Traffic Inspection System (IPA) Development of railway system (PHARE)
Ministry of Agriculture	Central government	Agriculture Forestry Fishing Rural development	Land Parcel Identification System <i>http://www.arkod.hr/</i> Geoinformation system for fishery

Ministry of Tourism	Central government	Tourism	
Ministry of Environmental and Nature Protection	Central government	Environment Nature protection	Air Quality Register of pollutants Environment protection information system
Ministry of Construction and Physical Planning	Central government	Spatial planning Construction works	Information system of spatial planning https://ispu.mgipu.hr/
Ministry of War Veterans	Central government		
Ministry of Health	Central government	Health	
Ministry of Science, Education and Sports	Central government	Science Education Sport	
Ministry of Culture	Central government	Culture	Register of cultural objects

There are also other institutions involved in policy making: state offices, state administration bodies and government offices.

The transposition of INSPIRE Directive has been made through the Law on National Spatial Data Infrastructure (NSDI). Policy making organisation is State Geodetic Administration under the Ministry of Construction and Physical Planning. Government together with Ministry of Public Administration is responsible for development of State Information infrastructure and connection of key registers (Table 3).

Table 3. Support for the national data infrastructure

Name	legal acts responsible for relating to data	Initiatives	Funding sources
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State Geodetic Administration	NSDI Law	INSPIRE	State Budget IPA (Instrument for Pre-accession Assistance) SIDA (Swedish International Development Agency)
Ministry of Public Administration	State Information Infrastructure Act	e-Citizens	State budget

Development of NSDI can be followed on NSDI web page⁸. In September 2014, NSDI geoportal on national level has been officially launched.

Central state portal assure access to data from public authorities⁹. Government started with the Project e-Citizens¹⁰. The project aims to simplify communication between citizens and public authorities in both directions and to increase transparency in public services.

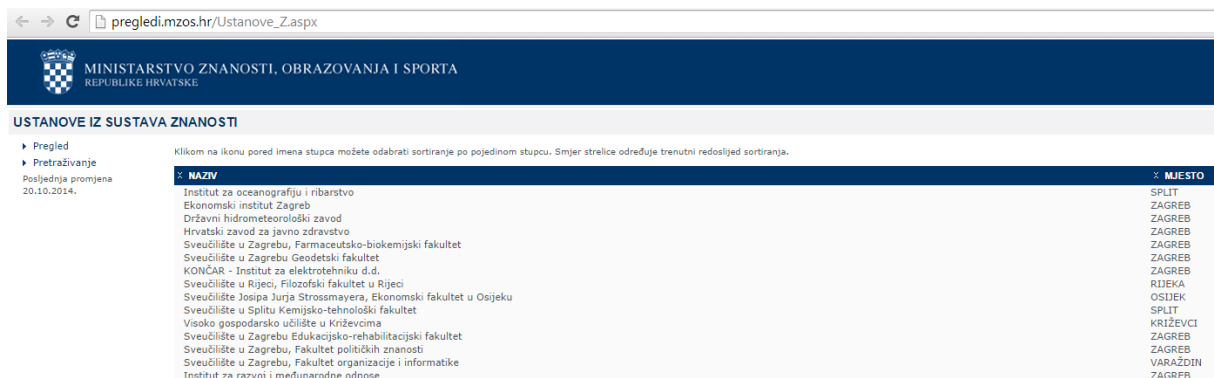
⁸ www.nipp.hr

⁹ <https://vlada.gov.hr/sredisnji-drzavni-portal/203>

¹⁰ <https://gov.hr/e-gradjani/23>

4 Research organisations

There are several classification categories of research organisations. The line ministry for science and research is Ministry of Science, Education and Sports. There is also national legislative in form of Law on Science and Higher Education. There is list of institutions and organisations in the system of science (Figure 2) that could be found on web of Ministry. There are overall of 183 registered institutions¹¹.



The screenshot shows a web browser window with the URL pregledi.mzos.hr/Ustanove_Z.aspx. The page header includes the logo of the Ministry of Science, Education and Sports of the Republic of Croatia. The main content area is titled "USTANOVE IZ SUSTAVA ZNANOSTI" and contains a table of institutions. The table has two columns: "NAZIV" (Name) and "Mjesto" (Location). The institutions listed include various institutes and faculties across different cities in Croatia.

NAZIV	Mjesto
Institut za oceanografiju i ribarstvo	SPLIT
Ekonomski institut Zagreb	ZAGREB
Državni hidrometeorološki zavod	ZAGREB
Hrvatski zavod za javno zdravstvo	ZAGREB
Sveučilište u Zagrebu, Farmaceutsko-biokemijski fakultet	ZAGREB
Sveučilište u Zagrebu, Geodetski fakultet	ZAGREB
KONČAR - Institut za elektrotehniku d.d.	ZAGREB
Sveučilište u Rijeci, Filozofski fakultet u Rijeci	RIDEKA
Sveučilište Josipa Jurja Strossmayera, Ekonomski fakultet u Osijeku	OSIJEK
Sveučilište u Splitu, Kemijsko-tehnološki fakultet	SPLIT
Visoko gospodarsko učilište u Knjevcima	KRIŽEVCI
Sveučilište u Zagrebu, Edukacijsko-rehabilitacijski fakultet	ZAGREB
Sveučilište u Zagrebu, Fakultet političkih znanosti	ZAGREB
Sveučilište u Zagrebu, Fakultet organizacije i informatike	VARAŽDIN
Institut za razvoj i međunarodne odnose	ZAGREB

Figure 2. List of institutions on web of Ministry of Science, Education and Sports

There are following categories of research institutions - universities, colleges, research institutes and private companies that are active in research. In Croatia, higher education is mostly under Ministry authority and is organised within universities which have faculties as their components. Each faculty is legal subject and has its own autonomy until certain level. Colleges, on the other hand, have their programmes, but each college is one legal subject. There are also state universities and private colleges as well. These private colleges are more market oriented with specific aim to create professional workers ready for job market, and they do not have emphasis on scientific and research approach.

Besides Ministry of Science, Education and Sports, there is another public body which deals with system of science and higher education in Croatia, Agency for Science and Higher Education¹². Figure 3 shows types of higher education institutions.

¹¹ http://pregledi.mzos.hr/Ustanove_Z.aspx

¹² <https://www.azvo.hr/>

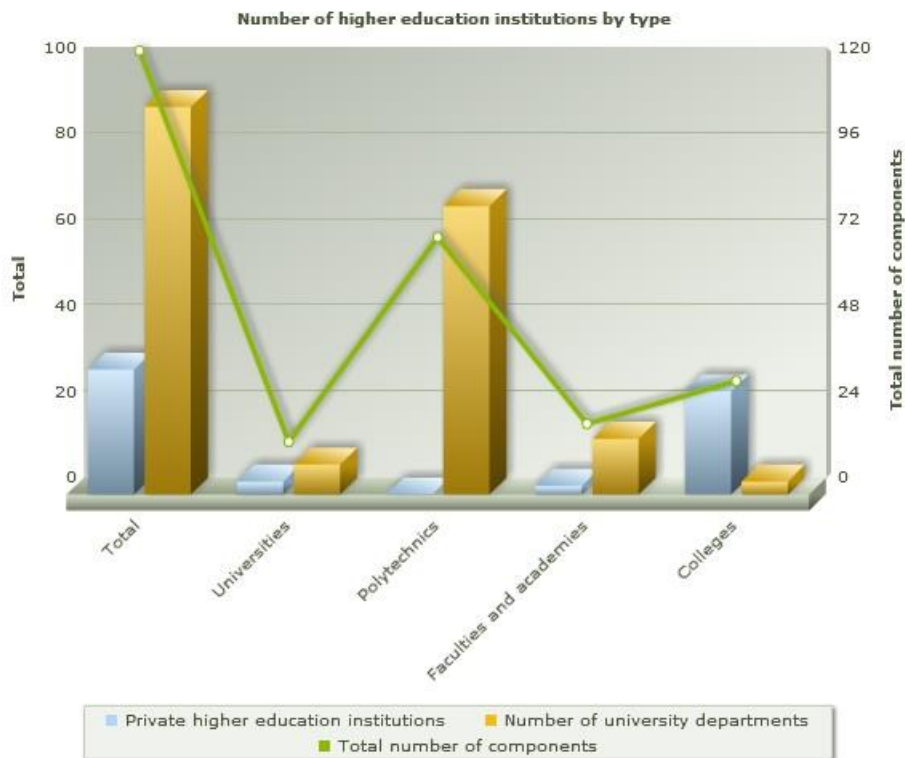


Figure 3. Types of higher education institutions in Croatia

It should also be mentioned that in Croatia, the problem of an extremely centralized system is present which can be also transposed to public research institutes. The majority of these organisations is located in state capital, Zagreb (Figure 4).

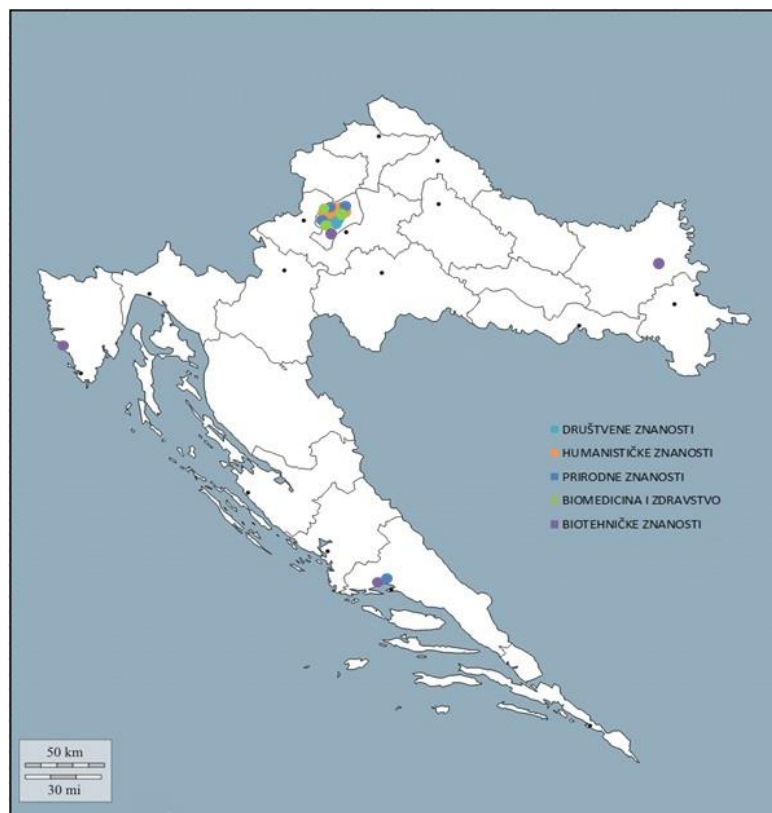


Figure 4: Spatial distribution of public research institutes in Croatia

List of key organisations in research system is given in Table 4.

Table 4: List of key organisations and research projects in Croatia

Name of organisation	Classification	Completed and current projects referred to EUSDR	Direct linkage to EUSDR (Yes/No)
Faculty of Geodesy, Zagreb	University	Geopotential and geodynamics of the Adriatic Sea	No
		The altitude kinematics and the dynamics of continental Croatia	No
		Cartography of the Adriatic Sea	No
Faculty of Civil Engineering, Architecture and Geodesy, Split	University	Analysis of mixing surface watersheds process	No
		WATER BALANCE AND runoff MODELING IN KARST	No
		Development of a spatial systems for the support in decision making in the case of waste disposal	No
Faculty of Civil Engineering, Zagreb	University	The impact of the environment on the design and sizing of water structures	No
Faculty of Architecture, Zagreb	University	Croatian Urban and Landscape Heritage as part of European culture	No
Faculty of Mining, Geology and Petroleum Engineering, Zagreb	University	Pottery production in prehistoric cultures, especially Hallstatt culture, of Croatian and Austrian Danube regions	Yes
		Comparison of Terroirs of Istria, Vienna and Wachau, Assessing European capacity for geological storage of carbon dioxide (EU GEOCAPACITY)	No
		Groundwater and dependent Ecosystems: New Scientific basis on climate change and land-use impacts for the update of the EU Groundwater Directive	No
		Pan-European coordination action on CO2 Geological Storage (CGS EUROPE), European value chains for CO2 (ECCO)	No
		Mass use of geospatial informations in science and teaching by faculty WebGIS system developed within the free and open programming environment	No

		Geophysical Research aquifer systems, the environment and energy resources	No
		Rational use of energy minerals in Croatia	No
Faculty of Chemical Engineering and Technology, Zagreb	University	Wastewater treatment by advanced oxidation technologies, Purification and stabilization in large water supply systems	No
		The application of catalysis in environmental protection	No
Faculty of Chemical Technology, Split	University	Natural zeolites in water protection	No
Faculty of Traffic Engineering, Zagreb	University	The development of railways as a future carrier traffic load	No
		Integration of intermodal water transport in the European transport network	No
		The parameters of environmental influences on the development of infrastructure and transport systems	No
		Strategic modeling of air traffic	No
Faculty of Mechanical Engineering and Naval Architecture, Zagreb	University	Optimizing the introduction of new technologies into the regional energy system	No
		Optimization of water turbines for small hydro	No
		Biofuels - the necessity of sustainable mobility in Croatia	No
		Environmental acceptability and efficiency of modern water treatment processes	No
Ruđer Bošković Institute, Zagreb	Research institute	Organic compounds as molecular markers of anthropogenic impacts on the environment	No
		The biodiversity of benthic communities in the Adriatic: natural and anthropogenic forcings	No
IGH Institute, d.d.	Research institute	Traffic protection from the wind on the highways	No
Croatian Geological Institute	Research institute	The basic hydrogeological map of Croatia, Geothermal Map of Croatia	No

Croatian Academy of Sciences and Arts	Research institute	Complementary transport policy, The transport acquis	No
Faculty of Agriculture, Zagreb	University	Croatian soil in Correlation with World reference base for soil	No
		The spatial distribution of economically important pests by using GIS	No
		Application of GIS technology in plant growing - digital thematic maps	No
Faculty of Agriculture, Osijek	University	Identification of economic activity as a function of rural development	No
		Management of water resources in irrigation of eastern Croatia	No
Croatian Forest Research Institute, Jastrebarsko	Research institute	Growth and development of forests in different ecological and economic conditions	No
		Forest habitats in terms of exposure to harmful impacts and climate change	No
		Breeding and Seed forest	No
Faculty of Natural Sciences and Mathematics, Zagreb	University	Research of Endangered sea flooded karst habitats in Croatian coastal seas	No
		Changes in environmental and cultural landscape as a development resource	No
		Vascular flora of the Adriatic area biodiversity	No
		Invasive species of invertebrates in freshwater ecosystems in Croatia	No
Oceanography and Fisheries Institute, Split	Research institute	Management and biodiversity of marine living resources in the Croatian coastal	No
		Biodiversity and management of pelagic and demersal resources of the Adriatic	No
Faculty of Forestry, Zagreb	University	Variability and conservation of genofunds precious hardwoods in Croatia	No
Medical Research and Occupational Health Institute, Zagreb	Research institute	Carcinogenic and potentially carcinogenic pollutants in the air	No
Faculty of Electrical Engineering and Computer Science, Zagreb	University	Energy security and climate change	No

Faculty of Engineering, Rijeka	University	Research and development of components and renewable energy systems	No
Faculty of Civil Engineering, Zagreb	University	Interaction of drainage and irrigation system and environmental factors	No
Faculty of agriculture, Osijek	University	Management of water resources in irrigation of eastern Croatia	No
University in Osijek - Physics Department	University	The radioactivity in environment, detection and application	No
OIKON d.o.o.	Private company	Bioindication of air pollution in terrestrial ecosystems	No
		Web-based Urban and Industrial Air Quality Assessment and Management	No
		Public health impact of long-term, low-level mixed element exposure in susceptible population strata	No
		Anthropogenic impacts on sea and inland waters	No
		Anthropogenic impacts on terrestrial macrofauna with a focus on protected species in Croatia	No
		The parameters of the productivity and stability of forest ecosystems	No
		Biological, landscape and environmental diversity of Croatia in space and time	No
Ivo Pilar Institute	Research institute	Danube Pie International project	Yes
Technological park Varaždin d.o.o.	Private company		
Ivo Pilar Institute	Research institute	Study on reducing pollution Sava River Basin	No
Croatian Waters	Public company		

Table 4 gives an overview of projects that could be useful for Danube Strategy, and some of these projects can be mapped with table Data and Service Resources from Data Inventory (i. e. Croatian Geological Institute - project The Basic hydrogeological map of Croatia). These projects for results have data or service that can be used as support for EUSDR. Other projects have potential to become useful for EUSDR, but are not directly connected to the Danube Strategy, or do not provide results in form of available spatial or non-spatial data that could be reached, or at least have public visibility – it is not usually known if this kind of data exist.

Some organisations are conducting projects directly involved with, or financed from EUSDR. These organisations are in minority.

Figure 5 shows analysis of Table 3 with percentages of institutions currently involved, or finished cooperation in conducting projects for EUSDR, and other ones that could be linked, e.g. are referenced to DRDSI keywords and EUSDR nexus.

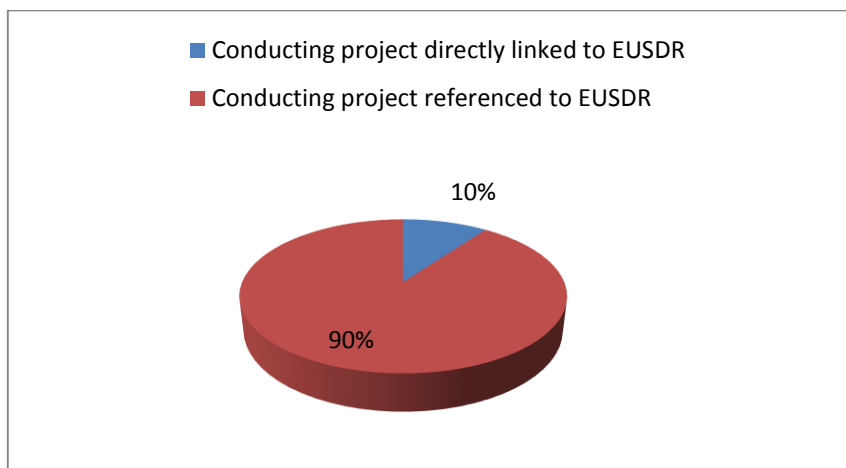


Figure 5: Percentages of institutions directly linked, or referenced to EUSDR

Following graph (Figure 6) shows quotas of institutes, universities, and private research organisations in overall number of research institutions.

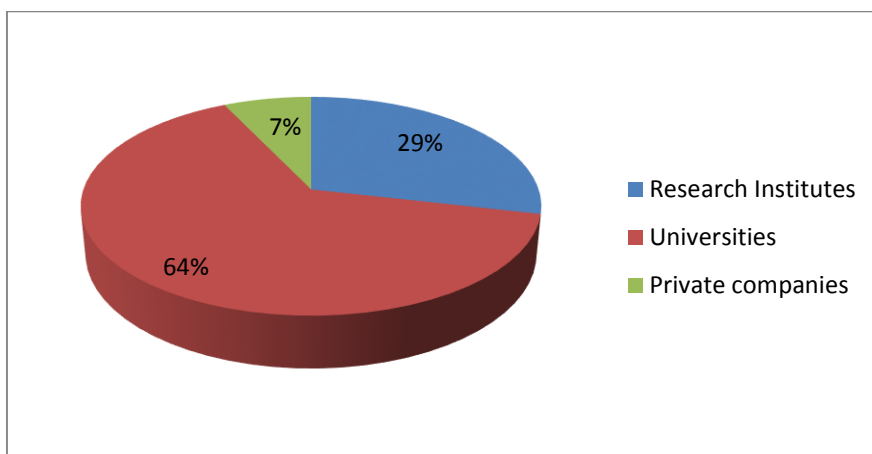


Figure 6: Quotas of institutes, universities, and private research organisations

It is clearly visualized that research organisations do not have paradigm of working on projects to directly support EUSDR, but have great potential which is transparent from the list of projects that could be useful for EUSDR. We could conclude that Danube Strategy is not disseminated among research and scientific community in Croatia enough. Moreover, it is practice in majority of listed project to be national character financed from national sources. Some are conducted through partnership, either bilateral or multilateral and financed mostly from more recognized programmes Horizon 2020, or former FP7 programme, and some other programmes within European cohesion and structural funds.

On the other hand, there is great potential from these projects and organisations to support Danube Strategy, but with possible barriers to willingness to participate in building Danube Referenced Data and Service Infrastructure because of complicated administration and delays mostly from this kind of reasons.

Research organizations are, in most cases, linked to data providers in form of using their data for conducting research, rather than producing or providing data as results of research. There are also mostly linked to policy makers as latter engage, or hire research organisations to conduct certain research projects for them.

The state-of-play on research institutions in Croatia which could be identified with following assertion from Danube Strategy is yet to expect:

- targeted support for research infrastructure will stimulate excellence and deepen networking between knowledge providers, companies and policy-makers. The region must use national and regional funds better, and benefit fully from the European Research Area. Existing bilateral agreements should lead to multilateral coordination. Developing regions downstream can benefit from the leading - indeed world-class - innovative regions upstream. Top-performing regions in Europe can be found in the area. Others lag a long way behind.
- they need to benefit, through better connections between innovation and business supporting institutions. Clusters and links between centers of excellence, binding them into existing education and research networks, will extend the competitiveness of upstream enterprises to the whole region.

5 Stakeholder engagement organisations and networks

Stakeholder engagement can be seen through different types of organisations:

- NGOs
- Societies and Associations
- Chambers

There are many NGOs in Croatia since there is opportunity to finance activities of NGO's from public sector, local government or ministries. There are also organisations of informal characteristic i.e. societies, and formal organisations of professionals, like chambers of geodetic engineers and forestry engineers which licence and control individual experts in their work, with ability to deduct business actions of certain members, or even not members.

These are all organisations that have ability and established channels to reach potential stakeholders, whether through direct contact of their members, or through mailing-lists, organised events, etc.

Table 5 gives an overview of these stakeholder engagement organisations.

Table 5: List of stakeholder engagement organisations and networks

Name of organisation	Geographic area of operation	Area of interest
Croatian Chamber of Chartered Geodetic Engineers	International	Organisation for licencing geodetic engineers and professional responsibility insurance, as well as organising symposiums and long life learning programmes
Croatian Geodetic Society	National	Non-government association of geodetic experts, more for informal gathering, but also for organising professional conferences
Croatian Association of Employers - Geodetic and Geoinformatic Profession	National	Association of geodetic and geoinformatic employers within Croatian Association of Employers
Croatian Geographic Society	National	NGO for gathering geographers in informal and formal (conferences) events
Croatian Cartographic Society	National	NGO for cartographers (publishing journals, organising events, etc.)
Croatian Geological Society	National	NGO for gathering geology experts
Green Forum Association	National	Environment protection
SUN - Association for Nature, Environment and Sustainable Development	National	Environment protection
Green Action Association	Local	Environment protection
Green Istria Association	Local	Environment protection
Sustainable Community Development Association	Local	Environment protection
PRESS CENTER FOR CROATIAN ENVIRONMENT	National	Environment protection

Zeo Nobilis Association	Local	Environment protection
Franjo Koščec Association	Local	Environment protection
Ecological Society PAN (EKO PAN)	Local	Environment protection
Green Osijek	Local	Environment protection
Dolphins Dream Association	Local	Environment protection
Green Action Mičevac	Local	Environment protection
Ecological Organization	Local	Environment protection
Eco center Caput Insulae-Beli	Local	Environment protection
Ecological Association EKO-EKO Komin	Local	Environment protection
Ecological Association Kosinj	Local	Environment protection
Environmental Association GREEN DREAM	Local	Environment protection
Ecological Society Brod	Local	Environment protection
Ecological Society Koprivnica	Local	Environment protection
Ecological Society Zeleno Zagorje	Local	Environment protection
Ecological Society Žumbreak	Local	Environment protection
Ecological Society Fiolica	Local	Environment protection
Ecological Society Green Action Stari Mikanovci	Local	Environment protection
Ecological Society Lijepa Naša	Local	Environment protection
Environmental Association JAKUŠEVEC	Local	Environment protection
PCAP International - International Society for Prevention of Cruelty to Animals and Plants	International	Environment protection
Drava League	National	Protection of river Drava, conducting various projects on this issue
Drava Documentation Center	National	Promotion of River Drava
Croatian Chamber of Forestry and Wood Technology Engineers	National	Licensing forestry engineers, organising professional conferences, publishing journals
Croatian Forestry Society	National	Non-government association of forestry experts, more for informal gathering, but also for organising professional conferences, supporting various projects
Croatian Water Pollution Control Society	National	Organising congress, publishing, informing members on significant events from this area
SLAP - Union for Conservation of Croatian waters and sea	National	Promoting, development of water and sea management in Croatia
Croatian Meteorological Society	National	NGO for informing and gathering meteorological experts, organising conferences and events
International Sava River Basin Commission	International	Establishment of an international regime of navigation on the Sava River, sustainable water management, prevent or limit hazards on Sava river

International Commission for the Protection of the Danube River	International	Sustainable and equitable use of waters and freshwater resources in the Danube River Basin
Croatian scientific society for transport	National	transport sciences and profession promotion, journals, books and other publication editing, organisation of congresses
Croatian Energy Society	National	Gathers, on voluntary basis, experts and scientists in the field of energy industry.
Croatian Association of Energy Certificators	National	Promote and develop energy efficiency and renewable energy resources in Croatia
Croatian Hydrological Society	National	Organising conferences, publishing of editions on hydrology

From Table 5 we can see that there are international, national and local character organisations. Within DRDSI keywords area of interest, the majority of organisations are local character and work on environment protection. We can anticipate that these organisations do not have capacity to participate in DRDSI, because most of these local organisations (NGO's) do not have any employees, or have small number of members. There is general issue in Croatia about registering NGO's with minimum of three members, which many people abuse in order to get funding from national or local government bodies, but not funding for real project or programme, then for personal interest of these three or some more members International organisations have good organisation and management, so they could give more contribution to DRDSI than local, or national. National organisations have various organisation context. There are good examples with capacity and operative ability to participate in DRDSI (Croatian Hydrological Society, Croatian Meteorological Society, Drava League, Croatian Geographic Society, Croatian Chamber of Forestry and Wood Technology Engineers).

As mentioned above, since there are a lot of questionable organisations, but also really professional ones, and they have the same legal status, there is potential problem of misclassification of these organisations when approaching from perspective of Danube_NET with inquiry of willingness and ability to participate in DRDSI.

One more potential barrier for stakeholders (these kind of organisations) is fact that since management of these organisations are mainly not professional (meaning, they are not paid), it is questionable if they are willing to participate in DRDSI or even contribute to contact stakeholders, if they do not have clear visible information or indication of their direct interest. So, because most of regular activities performed within these organisations are not paid, they are based on voluntary work, there is potential barrier if these people are asked to put some more effort or to invest more of their free time in this work for which they are not paid.

But, there is option for promotion of DRDSI among NGOs if contact establishes with Office for cooperation with NGO's of Government of Republic of Croatia. Of course, if communicated well, these organisations could recognize possibility of modernizing their work processes if included in DRDSI and use data from DRDSI, so this could be a good impulse for them.

Chambers, societies and associations do not have one central contact point as NGOs do, and they should be contacted separately and individually which could be difficult in promotion of DRDSI, but we should also consider two-way promotion, and it should be mentioned that when participating in DRDSI there is promotion in other direction, promotion of these organisations to out – all these organisations have interest in

popularization of their activities and their name. So, this could be one argument in approaching to stakeholders for participation in DRDSI, or even as goal of potential projects where they could be partners.

6 Conclusions

This State of Play report gives an overview of current situation in Croatia as a support to DRDSI development. It covers: Data providers, Policy-making organisations, Research organisations and Stakeholder engagement organisations and/or projects. Further communication and investigation needs to be done on individual basis through direct contact.

Overall readiness in contribution to EUSDR is in general good. However there is a clear communication problem since many of actors don't know about EUSDR and potential benefits for them. EUSDR and especially DRDSI need to be better communicated. It could be in both way top-down through responsible ministries and bottom-up through the pilot projects. Launching of START - Danube Region Project Fund and start of the proposed projects could be a good trigger for improvement.

NSDI development is for sure an initiative that together with INSPIRE implementation gives support to DRDSI.

Access to public data, in general, is regulated by the Law on access to public information (transposition of PSDI Directive). However pricing policy and licensing are still critical factors. Key bottleneck is also lack of metadata. In some cases it is obvious that data exists, but there is no other information (which format, access conditions, etc.).

Further development needs on the first place awareness raising. Some good examples/best practices could be also very helpful. Key actors must clearly see their benefits but also benefits for the whole region. Networking opportunities should be investigated and possible funding sources.