

Data collected by this survey will be used to assess the level of usage of environmental data and information available from its data sources (EIS – data bases of Agency, and also data bases of other relevant institutions which are historically dealing with a specific area of the environment in Republic of Croatia), and particularly the level of use of data presented through the environmental indicators from publication *The Environment in Your Pocket*. Like similar studies, this research will also enable the assessment of usage of environmental data and information [8, 9] in order to improve their availability and quality of presentation to decision-makers, scientific, professional and greater community, which is one of the primary tasks of the Agency.

3 Survey Implementation

The Environmental Information Use Assessment Questionnaire was distributed together with *The Environment in Your Pocket I - 2008* to relevant ministries, administrative bodies in counties and the City of Zagreb, state administration offices in counties, libraries at faculties of the Croatian universities, and libraries in the City of Zagreb and other major cities. The publication was also posted to all secondary Eco-schools in Croatia, and to selected secondary schools with curricula based on natural and technical sciences related to the environmental protection segments. The publication and Questionnaire was also posted at the Agency's website (<http://www.azo.hr>).

4 Survey Results

The Environment in Your Pocket I – 2008 and the Questionnaire were posted to 430 addresses. The Agency received 193 properly filled out Questionnaires that represented a 44.9% response rate. Responses sent by postal mail amounted 78.7%, and Questionnaires filled out at the Agency web site amounted 21.3% of all responses. The responses were statistically analysed, as presented in the diagrams below.

In order to determine user groups of the environmental data and information, they were stratified. The majority of interested parties included pupils (28.8%), public servants (16.6%), and university students (13.5%).

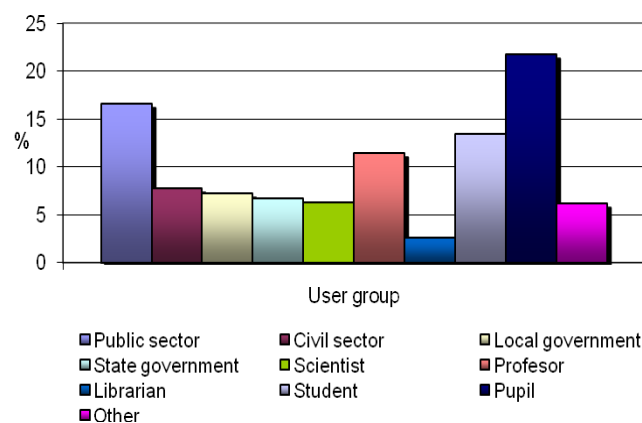


Fig.1 Groups of the environmental data and information users

Among environmental topics presented in *The Environment in Your Pocket*, the most interesting topics, according to the users, were Waste (15.2%), Air and Climate change (14%), Inland waters and Water quality (13.6%), and the least interesting were Soil and Agriculture (6.9%) and Public relations (5.3%).

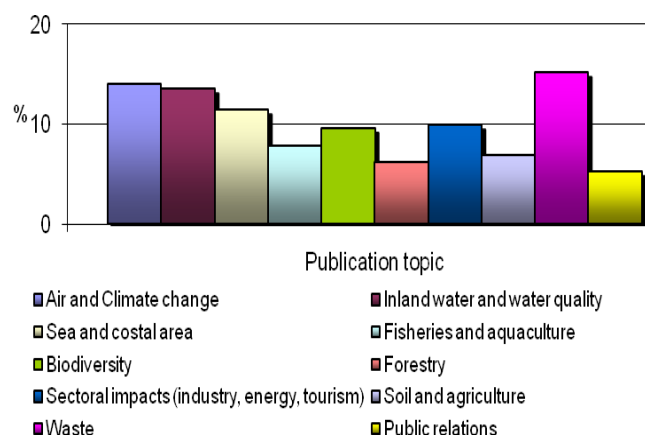


Fig.2 Assessment of public interest in specific environmental topics

In order to obtain data on usage of the environmental data and information presented in *The Environment in Your Pocket*, seven possible responses were offered in the Questionnaire. According to these responses, the publication is most frequently used as educational tool (40%) and as source of personal information (28%).

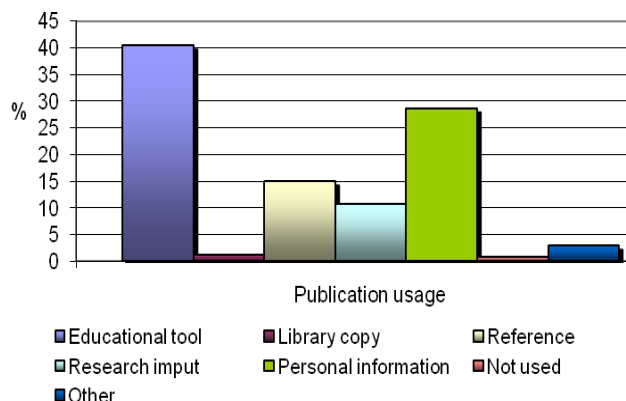


Fig.3 Usage of data and information presented in the publication

The survey results were additionally analysed for the assessment of level of interest in these data for educational programs. The analysis showed that the environmental data and information were most frequently used in the field of ecology and the environmental protection issues (72%). Share of 18.3% respondents used the data and information from the publication as extra books for the education on following fields: Biology, Chemistry and Physics.

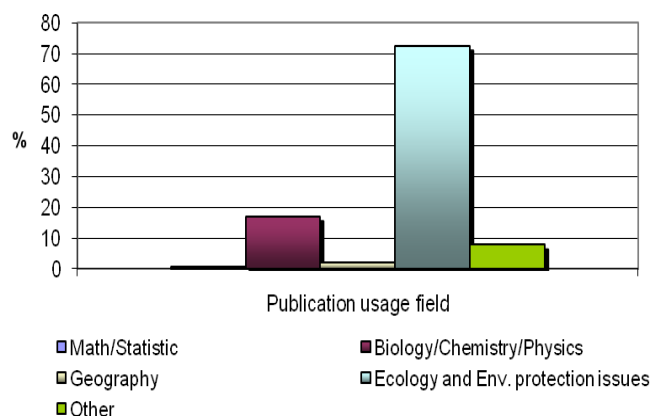


Fig.4 Usage of *The Environment in Your Pocket* in education

Through this research user satisfaction with covered environmental topics in the publication was also analysed. According to results, 67% of the respondents were satisfied with the presented environmental topics, and 33% of them suggested inclusion of new environmental topics in the future editions.

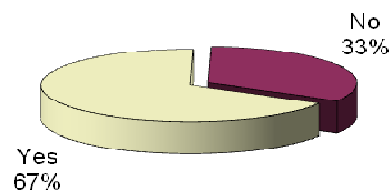


Fig.5 Satisfaction of users with the environmental topics covered

The respondents that gave suggestions on additional topics for the future editions of *The Environment in Your Pocket* (33%) were offered a possibility to recommend new environmental topics that should, according to their opinion, be included in the future editions of the publication. The analysed data showed the highest interest in the sector of industry (19%), information regarding environmental legislation (15.9%) and information about pollution impact on public health (14.3%).

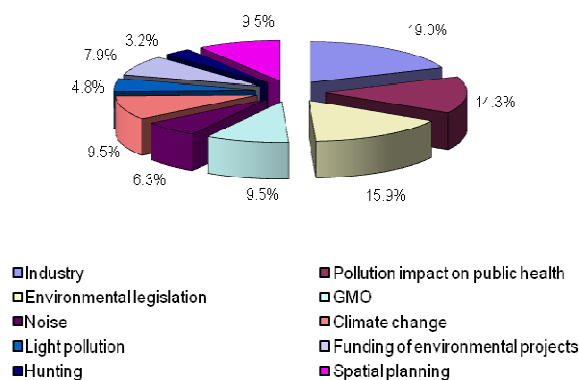


Fig.6 Recommendations of public for *The Environment in Your Pocket* editions in the future

The respondents that filled out their Questionnaires were also asked to evaluate the method of presentation, and Agency received information about quality and clearness of environmental data analysed and presented in *The Environment in Your Pocket*.

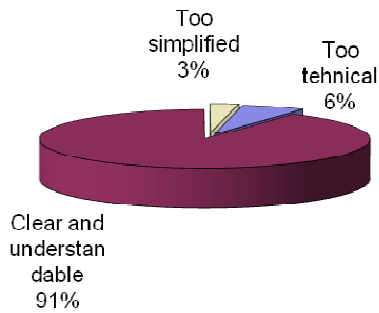


Fig.7 Evaluation of the method used to present the data and information in the publication

Since the Agency has other sources of environmental data and information (databases, reports, leaflets) other than publication *The Environment in Your Pocket*, their usage was also assessed. Out of 89% of respondents that declared themselves as users of other Agency's data and information, 33% said they used databases, 29% used reports and 27% of them used leaflets as additional data sources. The remaining 11% of respondents did not use any other database and information in addition to *The Environment in Your Pocket*.

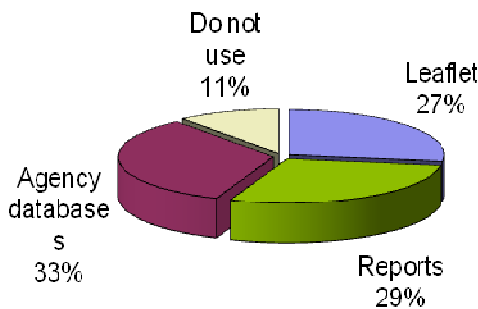


Fig.8 Assessed usage of other sources of the environmental data and information provided the Agency

The usage of data and information available on website of the Agency was also assessed. The results indicated that 55% of respondents used data and information from the website (<http://www.azo.hr>) in their work and education, 31% for their personal interest and 14% of respondents did not use these information and data at all.

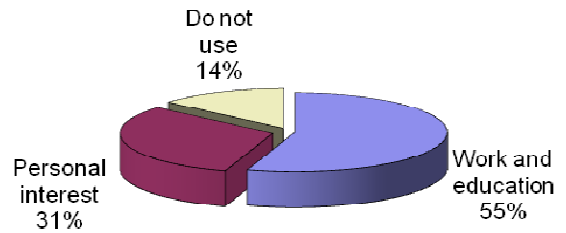


Fig.9 Assessed usage of the environmental data and information from the website of the Agency

Also, the Questionnaire suggested 8 possible answers about the way how respondents are receiving the publication *The Environment in Your Pocket*. The results showed that sources of information about the publication came mostly by other users of the publication, but also from the Agency through the annotation of The World Environment Day.

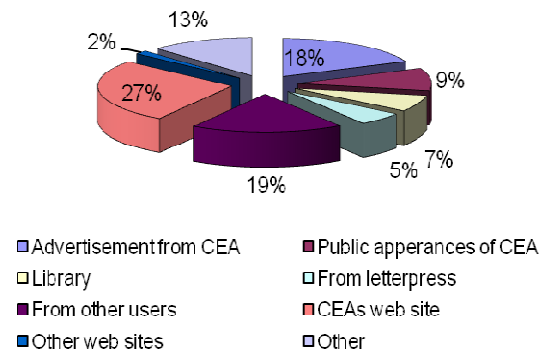


Fig.10 Sources of information about the publication

Through this Questionnaire, Agency was given the information regarding accessibility of publication to the users. The major part of respondents (41%) receives their publication yearly, 22% almost every year while 20% of respondents got the publication for the first time through this survey. Share of 17% respondents gets this publication occasionally.

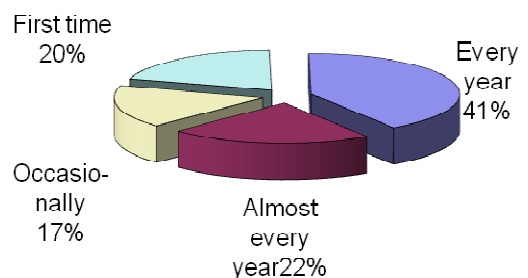


Fig.11 Accessibility of the publication to the users (frequency of receiving a publication)

Agency isn't the only source of environmental data and information. Other sources were also recognized through this Questionnaire. The most significant one is head Ministry of Environmental Protection, Physical Planning and Construction (42%). Besides above mentioned, professional literature like varies of specialized environmental magazines (20%) and also Environmental Protection and Energy Efficiency Fund (EPEEF) are significant source environmental of data and information.

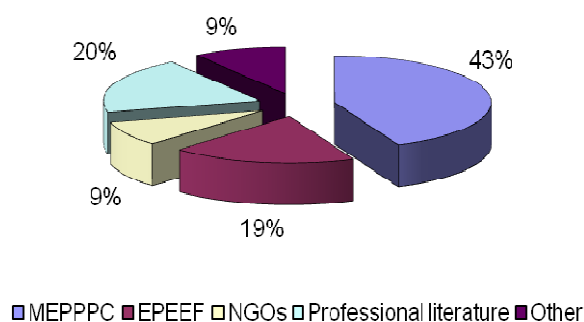


Fig.12 Other sources of environmental data and information in Croatia

5 Discussion

Data and information regarding environment are always interesting. They are the key to taking well-founded decisions for the environment and every citizen of the Republic of Croatia has a right of access to them. Above mentioned statements are based on the Environmental Protection Act (Official Gazette 110/07) (Act) with a reference to regulations that define the *Principle of access to information and public participation*. By this principle it is insured public right to access environmental information that are in the possession of governmental bodies as well as timely notifications regarding pollution of the environment and taken measures, and regulations and basic acts regarding environmental protection. To the same Act, Agency is accomplishing some of its basic activities, as follows:

- collection and integration of environmental data and/or information
- monitoring and reporting about the state of the environment
- preparation of data for drawing up documents and reports in relation to environmental protection and sustainable development
- ensuring conditions for access to environmental information, held by it and under its supervision [10].

For the monitoring of environment as well as calculation of environmental state indicators, it is

necessary to establish information system that contains environmental data and information [11]. Regarding that facts, Agency has established, developed, maintained and coordinated national Environmental Information System (EIS).

EIS is a sequence of information electronic databases and sources of data regarding environmental state, impacts on environment, spatial characteristics and other data and information crucial for monitoring state of the environment on the national level. In that way, data and information are available through internet portal Environment Information System on the website of the Agency that ensures access to data and information to all users and general public. By that, interoperability has been ensured, with a reference to ability of informational and communicational systems and processes that are supporting and enabling data and information flow [4]. In so doing, the institutions which are obliged to submit data and information to EIS are public administration, competent administrative bodies in counties and in the city of Zagreb, legal entities with public authorities and authorized entities that deliver data and information regarding environmental protection and sustainable development according to Environmental Protection Act (Official Gazette 110/07) and other regulations [10].

At the national level, EIS provides access to data and information about state and pressure on certain areas of the environment, ensuring consideration of the real and fundamental problems of the environment and the possibility of action based on the implementation of legislation related to environmental protection. Establishing systematic and long-term monitoring of the state of the environment and trends, gathering and data processing, conducting analysis and reports, it ensures real grounds for strategic decision-making for the government of Republic of Croatia, not only in the environment area but also for the need of strategic documents of sustainable development in other sectors. Implementation of modern communication technologies enables quick access to gathered data to all interested parties that allows operability of acquired principles in information access and participation of public in decision-making regarding the environment [3, 4].

With this systematic approach, the Republic of Croatia has defined a path for creating a unique EIS which connects all existing environmental data and information, acknowledging principles:

- of editing information closest to the primary data source,

- acquiring the information once and distributing it among other participants of the system for various purposes,
- ensuring easier approach of the information to the end user, primarily governmental bodies of the Republic of Croatia for the needs of direction of the environment protection policy and monitoring of its implementation, as well as for scientific, expert and wider public needs [2, 4].

Following the latest practice in European Union with indicator approach and SEIS principles (Shared Environmental Information System established by European Environment Agency), EIS is designed as a decentralized but integrated information system, available via an Internet portal, based on information and the data provider's network, defined by the National list of indicators (NLI) [3, 4]. NLI is list of indicators about the state of the environment produced taking into account regulations, reporting obligations, international contracts and respecting the specific national needs [10]. In 2008 Croatian Environmental Agency has completed lists of indicators for total of 15 thematic areas, meaning data sheets were made for altogether 266 indicators. At the same time, in the line with Environmental Protection Act (Official Gazette 110/07), NLI is the base for reporting, especially for the State of the Environment Report for the Republic of Croatia [10].

EIS conceptual model consists of integrated information systems of all available data, data sets and environmental information via following individual systems, structured in four EIS basic groups:

1. Environment components
 - a) Air quality information system
 - b) Inland waters information system
 - c) Marine information system
 - d) Nature protection information system
 - e) Soil information system
2. Sectors pressures
 - a) Waste management information system
 - b) Agriculture and forestry information system
 - c) Industry and energy information system
 - d) Traffic and tourism information system
3. Health impact
 - Health and safety information system
4. Society responses
 - General environment topics information system

Within these main basic groups (11) content is defined through thematic areas and sub-areas (42). For each thematic area and/or sub-area, an information system is established as a part of the integral EIS. Harmonization of data collection and processing methodologies and introduction of national standards complying with those of the EU is one of the key activities expected to facilitate monitoring of state of the environment and implementation of environmental policies in the Republic of Croatia [4].

Besides gathering environmental data and information through EIS, Agency has a role in processing and using this gathered data and information in summarizing clear and understandable reports. Reports are an essential source of data and information about the environment, both for decision makers as well as for professional and general public [5]. Agency gathers and processes data and information as well as summarizes thematic reports in framework of separate thematic areas. Data that Agency is gathering are also processed and published in varies of publications for general public and are also presented through leaflets. Publication *The Environment in Your Pocket* combines more environmental topics and through it data from thematic areas: Air, Climate changes, Energy, Water, Sea and Coastal Area, Fisheries and Aquaculture, Waste, Soil and Agriculture, Biodiversity, Forestry, Public relations, presented for five years in a row [7]. One could say that this publication, made in pocket edition, has shown as understandable and useful source of environmental data and information to decision-makers as well as to general public.

The manner of presentation of environmental data and information in the publication *The Environment in Your Pocket* based on indicators. At the international level, so far the most influential state environmental Indexing System Core Set of indicators for the developed countries of the OECD (1994) [15]. For analysis of the implementation of the Action Program of the European Union, EEA has developed its own set of 37 indicators [13, 14].

By definition, an indicator is representative numeric value of periodically measurements of a case observed. Through data processing information is derived that is an efficient way to monitor changes and evaluate the state of the specific environmental segment. In that way it is easier to understand complex ecological problems as well as monitoring of attaining an objectives and measures which provides environmental protection and sustainable development strategies [12]. Indicators can be qualitative and/or

quantitative. They can also be representative, as well as important, precise, arguable, simple and correct.

The most important criteria for indicator selection are:

- importance of particular parameter from the negative impact on the environment point of view
- possibility of gathering and calculating the indicator.

Indicators can describe driving mechanisms of particular environment impact, consequences of that impact as well as arisen state, results of impact or responses of society to arisen situation [13]. Through standard typology of indicators by the European environment agency (EEA) that was adopted by the Agency, indicators are categorized in so called DPSIR system (Fig.13) [13, 14]. This is the casual framework for describing interactions between society and environment. By that framework, indicators are divided into following categories:

Driving Forces – (D): basic driving forces of the environmental impacts, e.g. Agriculture, Industry, Forestry, Traffic, Energetic, Tourism, etc.

Pressures – (P): effects of driving forces, e.g. an increase of concentration of fertilizers and their components in soil, urbanization, etc.

State – (S): current state, e.g. degradation of quality of air, soil, water, sea, etc.

Impact – (I): effects of pressures, e.g. eutrophication of coastal waters, fragmentation of habitats, lose of biodiversity, climate changes, etc.

Response – (R): measures and instruments in preparation and/or in force dealing with particular segments and/or sectors, e.g. ratified conventions, laws and regulations, economic instruments, provided projects, etc.

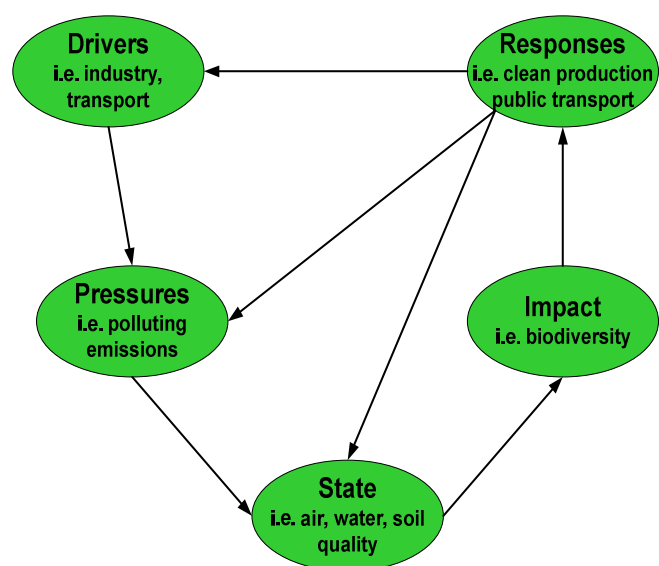


Fig.13. DPSIR system

On international level, an indicator of the state of the environment ensures comparison of environmental data and information with environmental data and information from other countries in European Union [15, 16]. Through processes of gathering and displaying data regarding state of the environment, Agency notes improvement in realization and insurance of access to environmental data and information on the national level as well as provide dissemination of required data for the region [5, 6].

The publication *The Environment in Your Pocket* is with reason conceptualized in an interesting, concise and understandable manner that ensures presentation of complete and reliable environmental data and information. In other words, this publication was from its start primarily aimed to general public and collaborators in educational system that has expressed interest in environment issues.

Main groups of environment data and information users have been determined through this survey. The result showed that the main interest for environment issues was in sector of education (pupils in secondary school and university students) as well as in public sector (public servants). Moreover, the results of this survey confirmed the hypothesis that publication, as source of data, is useful in secondary school educational programmes especially in ones based on Ecology and environmental issues as well as Biology, Chemistry and Physic. Besides the fact that the role of Agency in process of environment education is unquestionable, results shown in the publication in topic of Public relations point at continuous increase of number of enquires for delivering data from all public segments.

The results of this survey have shown that the publication *The Environment in Your Pocket* is mostly used as an educational tool (49%), and as a literature for personal information (26.8%). Towards the answers of respondents, the most interesting were data and information presented for following thematic area: Waste, Air and Climate Changes, Inland water and Water quality.

By the Questionnaire that was distributed along with the publication, respondents were given a chance to show their interest for other environmental topics that weren't yet edited in former edition of the publication. Almost 33% of respondents gave their recommendations. Most of the respondents expressed their desire that future edition of publication contain data regarding sector of Industry and themes regarding General environment topics – legislation of environment protection. Respondents also expressed a

big interest in proclamation of data considering pollution impact on public health, genetic modified organisms and spatial planning in the country. It is crucial to mention how, through this Questionnaire, was communication established between users of environmental data and information and Agency as central body of state government that gathers and processes environmental data and information on the national level. By doing so, prerequisites were made for improvements in availability and presentation of environmental data and information that Agency has as one of its primary activities. It is also important to mention that indicator approach presented in this publication was assessed as clear and understandable. This was the goal because the publication is intended to be understandable, interesting and useful to the general public.

Through this Questionnaire, information on accessibility of publication was also given. The results showed that most of the respondents (41%) gets the publication every year and 22% of them almost every year. Besides the fact that publication is in major edition available to all interested parties, it is also fully accessible on Agency website. The results collected through the Questionnaire show that 26% of users get its publication through Agency website. All above mentioned points at fulfilling one of the most important goals of Agency and that's ensuring availability of environmental data and information to all interested parties.

Besides the publication, environmental data and information are also available to all interested parties through data bases included in EIS as well as reports and leaflets that Agency is also announcing on its website. Towards results of the survey, an important share of respondents (33%) uses data bases as source of environmental data and information. On the other hand, almost 29% of respondents use reports regarding environmental state and other thematic reports that lead to conclusion that there is a great need for processed and interpreted data. Through reports, presentation of trends was given as well as projections of future state of the environment. So it is nothing strange that a great share of users reaches up exactly for them. Leaflets that Agency edits always process specific and actual topics, give announcement of some specific event (e.g. marking The World Environment Day, etc.) or brief directions on how to use some newly established database. Given that environmental issues are real in recent years, it can be concluded that the public is increasingly interested and inclined to use data not only for personal interest (31%) but also for work and education (55%).

In Republic of Croatia head government body for implementation of environment protection legislative is Ministry of Environmental Protection, Physical Planning and Construction (MEPPPC) that has been, besides Agency, recognized as a major source of relevant environmental data and information (39.9%). Apart from above mentioned, respondents declared that they use information from other sources as well, like professional literature (20%) and Environmental Protection and Energy Efficiency Fund (EPEEF). Mentioned Fund is often a source of information regarding fees (compensation for the use of motor vehicle, fees for environmental loading of waste etc.), incentives as well as projects (e.g. sanitation of landfills, etc.) that are in purpose of environment protection and encouraging energy efficiency in Republic of Croatia. In 2008, in the Republic of Croatia were active more than 300 Non - government organizations whose primary business, environmental protection and sustainable development. Research results showed that NGO's are sources of environmental information for 7.9 % of all users.

6 Conclusion

For the environmental protection is essential to establish a comprehensive and timely data and information flow about the state of the environment and the activities as well as about the interventions that change the space and the existing balance [17]. Given the foregoing, it is necessary to establish Environmental Information System as central repository of environmental data and information. It is recommended that this system is based on the principle of interoperability between relevant institutions that measure, process, possess and disseminate environmental data and information to the decision makers and interested parties. At the end system should be compatible and connected to the environmental information systems of other countries on the regional level rather because pollution and changes of the environment are know no boundaries [5]. Good management of environmental policies and enforcement environmental action programs depends on quality of information about the results and problems: where they came from, how important, what causes them and what success achieved environmental policy in dealing with them [1].

Given the foregoing, it is crucial to publish data and information from EIS as part of reports, publications, leaflets, etc., so they could be available to decision makers as well as to general public. Availability and dissemination of data and information are of great importance to raise public awareness of current

environmental issues and sustainable development and thus encourage the preservation of the environment.

The public survey conducted by distribution of publication *The Environment in Your Pocket I – 2008* with *The Environmental Information Use Assessment Questionnaire* lasted between 11 June 2008 and 24 December 2008. Out of 430 distributed Questionnaires, the Agency received 193 properly filled out Questionnaires or 44.9 % responses. Such a high level response rate confirms that an excellent relation has been established between environmental data and information users and the Croatian Environment Agency as their source of necessary data and information. The fact that the public response was as high as 44.9% also points out to the high public awareness for the environmental protection and sustainable development issues.

The survey determined public interest in specific environmental area/topics, which will be used as guideline for future improvements and advancement in data collection, analysis and presentation. The majority interested parties are pupils, public servants and students. The publication is mostly used as an educational tool and a literature for personal information. That shows that the Croatian Environment Agency has successfully fulfilled its objective - advancement in education and raise of public awareness about the environmental issues.

Satisfaction of respondents with the concept and method of the environmental data and information presentation in *The Environment in Your Pocket* is very high, since 91% of respondents said that the presentation is clear and easy to understand.

The survey results also reveal that the access of public to environmental data and information has reached a satisfactory level, since a large number of users are informed about other sources available at the Croatian Environment Agency – databases, reports and leaflets as well as other sources on the national level (MEPPC, EPEEF, NGO's).

Therefore, it can be concluded that, considering results of this and similar surveys, a statement from the environmental acquis: "Public awareness of environmental issues is growing, but the public opportunities to participate in decision-making in this area, as well as their access to information remains low" should be modified.

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