

Views on solid waste management by related agencies of the island of Rhodes, Greece

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Abstract

The management of Municipal Solid Waste (MSW) has become one of the major problems of our overconsuming era and constitutes an immediate priority of the European Union environmental policy, with its main objectives being the utilization of the resources contained in the waste, the improvement and protection of the environment and the safeguard of both the health and the prosperity of its citizens. In the framework of this waste policy and through both national and European legislation, objectives – milestones have been set, up to 2020, relating to a sustainable management by reducing the per capita generated waste, reducing sanitary landfills of residual materials, reusing and recycling at the maximum possible level. Basic axes to this direction constitute the necessity of promoting composting and highlighting the importance of recycling, in order to have a transition towards a rational waste management and to an environmentally-friendly economy that utilizes the natural resources more efficiently and promotes sustainable development.

In this context, the aim of the present research is to investigate the views of the Agencies involved in the management of MSW. The sample consists of twelve Management Agencies' representatives, the main criterion being the extent to which they deal with waste management. Qualitative research was chosen for the implementation of this study and semi-structured interviews as a means to achieve it. The analysis of the results shows that the majority of the sample argues that there is a laxity from the part of the State in implementing national legislation, screening at the source, composting, recycling and diversion from landfill. In addition, proposals are made for an integrated management plan with a revision of the Regional Plan, private sector involvement, implementation of recycling programmes and domestic composting.

Keywords: Waste management, recycling, composting, agencies' views.

Introduction

Looking objectively at the present situation, it can be observed that modern societies are facing significant environmental problems with a tendency for deterioration [1, 2], due to the way of thinking, the choices and the actions of humanity [3] in order to meet material needs in an uncontrolled pursuit of improving the economy [4, 5]. Humans with their hyper-consumerist behavior contribute to the increasing of greenhouse gas emissions which intensify the phenomenon of climate change [6]. It is overlooked that the content of development and the adoption of a sustainability standard must be based on qualitative development towards economic efficiency, environmental balance and social justice [7].

These attitudes have contributed, among others, to the waste increase due to the continuous demand and production [8]. The Directive 1999/31/EC of 26-04-1999¹, which is incorporated into the Greek legislation under Joint Ministerial Decision 29407.3508/2002², is published by the European Union in the direction of finding solutions for the protection of the environment and the reduction of pollution from waste. These laws no longer allow for the disposal of mixed solid waste in landfills making it illegal. In this direction the management of MSW has become one of the major priorities of the European Union environmental policy, with its main objectives being the utilization of the resources contained therein, the improvement and protection of the environment, and the safeguard of both the health and the prosperity of its citizens. In the context of waste management policy and through both national and European legislation, objectives-milestones have been set, right through to 2020, relating to a sustainable management by reducing the per capita generated waste, reducing sanitary landfilling to residual materials, reusing and recycling at the maximum level possible. Basic axes to this direction constitute the necessity of promoting composting of organic matter fractions of MSW as an important

¹ Council Directive 1999/31/EC of 26 April 1999 on the landfill of waste. Official Journal L 182, 16.7.1999.

² Joint Ministerial Decision 29407/3508/2002. Measures and conditions for the landfill of waste. Government Gazette No 1572 of 16-12-02. [in greek]

pillar of a modern integrated management system, with environmental, economic and social benefits and the necessity of highlighting the importance of recycling, in order to promote a transition to a rational waste management and to an environmentally friendly economy that utilizes the natural resources more efficiently and promotes sustainable development.

These laws, however, seem to have little application in Greece, where out of the 5.2 million tons of household waste produced each year, 74% are deposited in landfills and only 26% are disposed of in alternative ways [9]. Environmental policy in the context of waste management is in a stalemate, with the example of the sad reality in Athens that "indicates the pathogenic failure of perceptions that have addressed solid waste management as a technical issue that requires social consensus rather than a deep social problem that also has an important technical dimension" [10].

Although only occasional efforts are observed at both regional and local levels for the implementation of this policy, the effects to the environment are reduced to an important degree. Still there is room for improvement through the full implementation of existing regulations and expansion of policies to promote sustainable consumption and production practices, including a more efficient use of resources [11].

Disposal of waste

The complete elimination of the phenomenon of uncontrolled waste disposal and the definite closure of the Uncontrolled Waste Disposal Sites (UWDSs), which still exist today, despite the conviction of our country by the European Court of Justice and the imposition of heavy fines, is an absolutely necessary objective of national policy on waste management.

In order to achieve this goal, which will lead to the reduction of environmental degradation and to the protection of public health, interventions are needed at the level of planning and implementation of environmental rehabilitation projects of the UWDSs, which will lead to their physical reintegration into their neighboring environment. At the same time, the construction of infrastructure for the disposal and transshipment of waste has to be progressed -while also reforming the legal framework for the maritime transport- as a large number of the remaining active UWDSs is located in the island regions of the country and even in small islands lacking alternatives for the disposal and management of waste. Their operation cause significant environmental, economic and social repercussions.

The environmental burden is very high due to the lack of environmental protection measures such as infrastructure, biogas emission control equipment, waterproofing to prevent inflow of leachate into the subsoil and the aquifer. With regard to aquifers, the time for self-cleaning is usually measured over decades and artificial abatement of pollution is extremely costly and often unfeasible [12]. The environmental degradation of an area adjacent to the UWDSs has also economic consequences as the value of the building land, either for residential use or for tourism or recreational purposes, is reduced [13]. The economic impact of the illegal operation of the UWDSs affects all citizens. A typical example is the non-execution of a Commission decision against Greece (EU:C:2005: 592) which was appealed on July 2nd 2013 with regard to the Treaty on the Functioning of the EU (Case C-378/13, 2014). At the hearing in May 2014, the data presented show that of a total of 293 UWDSs, 70 were still in operation and 223 were not yet rehabilitated. By the decision C 502/03, EU:C:2005: 592, the Hellenic Republic is obliged to pay the European Commission a fine of ten million euros. Social implications, except for the environmental and economic ones, include the "Not In My Back Yard" phenomenon where distress, mistrust and negative attitudes of individuals and groups create serious controversy even over Residual Solid Waste Landfills (RSWL), although these are a form of organized and environmentally licensed waste disposal.

In the South Aegean Region, a total of 89 pre-existing UWDSs have been recorded. According to official numbers, in July 2013, 17 of these were active, 32 had been restored, 40 were undergoing rehabilitation. It should be underlined that the design of their rehabilitation is a complex task combining the environmental and wider needs of the area under study alongside the cost of implementing the proposed projects. The aim of the recovery is to address all the environmental problems caused by their operation by proposing alternative scenarios for reuse. The main axis in this direction is the reintegration of the site into the natural environment of the wider region. This can be achieved by developing new vegetation without altering the characteristics of the natural environment of the area [14]. For this purpose, in the last years, a programme for the restoration of the UWDSs has been implemented at national level. With a series of regulations and circulars, the mandatory procedure for the closure of these sites has been defined, along with their environmental licensing, the possibility for the integration of the rehabilitation project into a financial plan and finally the restoration by the implementation and completion of the project.

With regard to sanitary landfill, this is not just an environmentally friendly solid waste disposal technique but it is an integral part of their overall management, since all the MSW treatment and recovery techniques leave residues, for which a safe final disposal is required [15]. These sites are designed and function to minimize public health and environmental impacts [16]. They are

distinguished in landfills for inert, hazardous and non-hazardous waste [17]. For the construction of the third category, which includes municipal waste, an environmental license procedure is required by conducting an Environmental Impact Study and adopting a decision which approves of the environmental terms. Important data to be taken into account in the whole process is the design, the works required, the equipment, and biogas control and management.

Bio-waste management

The European Union, with the Landfill Directive 1999/31/EC, has set the main pillar of its urban waste management policy to reduce the biodegradable fraction sent to landfill in order to reduce the environmental impacts mainly from leachate production and biogas. The Directive establishes a progressive reduction in biodegradable biomass by 2020. In addition, Article 22 of the Framework Directive 2008/98/EC encourages the separate collection of biowaste for composting or fermentation and states that their treatment should ensure a high level of environmental protection.

In this area, the new national policy requires a systematic approach to the prevention of production, the separate collection and management of biowaste in order to achieve by 2020 the quantitative targets of separate collection (by at least 10% of their total weight) being set by the Law 4042/2012³. A prerequisite for this process is a shift towards a new direction with integrated - sustainable solutions that will lead to an improvement of the quality of the environment and life itself. The main pillar of the strategy for their sound management is production prevention through increased reuse, recycling and recovery of materials and energy with the aim of drastically reducing the amount of landfill. The diversion of biowaste stream from landfilling, which is at the heart of MSW management, can be achieved by combining collection and processing methods. This can be done either by sorting at the source or combined with mixed waste [18]. The products from this process can be led to relevant markets, and the residues to RSWL. The composting process is one of the main methods of biowaste treatment. This process should have as its primary objectives the reduction of weight and volume of the starting materials, the control of temperature and humidity, the elimination of pathogenic micro-organisms, the minimization of environmental impacts caused by greenhouse gas emissions, odors and suspended particles.

Taking into account the current situation, both in terms of existing networks and infrastructures, as well as institutionalized objectives, and the fact that recycling is at a low level (in 2011 corresponding to 15% of production, and composting to 3% of the total MSW produced) very little progress can be observed. This situation imposes the need to design actions to extend the separate collection of recyclable materials to discrete streams in accordance to Article 27 of Law 4042/2012, which incorporates Article 11 of Directive 2008/98/EC [19].

The benefits of this practice are multiple and vary depending on the material. Regarding paper, it not only saves valuable forest resources but also helps tackle climate change by limiting logging and saving energy consumed in producing new material. As for plastic, the deconstruction of which requires hundreds of years, the benefits focus on removing it from the natural environment, and on the other hand on recovering and supplying raw material for new products. Although recycling glass saves energy and resources, the best environmental option would be to reuse it by returning the bottles. This avoids the consumption of large amounts of energy required to achieve the right temperatures in the glass industry. Aluminum recycling contributes to saving natural and energy resources as mining needs and energy consumption are reduced. Its recovery requires a much smaller amount of energy. These data show that besides its contribution to improving and protecting the environment and reducing the consumption of natural, energy and economic resources, recycling leads to the diversion of packaging waste stream in Sanitary Landfill Sites (SLSS) by increasing their lifetime. In this context, recycling is an important key to achieving the EU's strategy for a shift towards rational waste management and an environmentally-friendly economy that makes more efficient use of its natural resources and promotes sustainable development.

Methodology

The survey sample consists of 24 representatives of all local organisations directly or indirectly involved in the management of solid waste in the Rhodes area. Representatives include elected ones in both grades of local government, officials of local authorities and the general government represented in Rhodes, scientific bodies such as the Technical Chamber, the Association of Public Works Designers, the University of the Aegean etc., commercial agents knowing the market pulsation, and social actors including environmental friendly organizations, NGO associations and others. This

³ Law 4042 / 2012 (Government Gazette 24/A/13-2-2012). 'Criminal Protection of the Environment - Harmonization with Directive 2008/99 / EC - Framework for waste production and management - Harmonization with Directive 2008/98 / EC - Regulation of issues of the Ministry of Environment of Energy and Climate Change' [in greek].

selection was dictated by the fact that the issue of solid waste, other than well-timed, is of vital importance to the island, with its thousands of visitors many of whom come from states that apply the most modern integrated management methods. The stagnation observed in the transition to sustainable management by SLSs to RSWLs, in line with EU directives, may also have an impact on the tourism industry.

For the needs of the work, qualitative research was chosen as a basic methodology and the structured interview as the most appropriate means for collecting the data. The tool, consisting of five modules and 40 questions, was edited on the basis of specific guidelines in the literature [20] to cover research questions focusing on three thematic axes: Knowledge and information, values and preferences, attitudes and beliefs. The interviews took place between the beginning of June and the end of September 2015 through a personal visit to the interviewers' workplaces. Statistical data processing was performed using the SPSS statistical packet. It is emphasized that none of the participants refused to participate in the survey and did not put forward a claim before, during or after the end of the interview.

Results of the survey

The presentation of the results of the survey is divided into five sections. In the 1st section, the findings of the survey concerning the views of the Agencies for the UWDSs and their restoration are presented. In the 2nd section, the results derived from the opinions of the respondents about the current situation of the SLS and its operation are described. The 3rd and 4th sections concern the views of the research sample on composting of organic materials and recycling, respectively. Finally, the 5th section presents the results concerning the views of the participants in this survey on integrated solid waste management solution and the transition from SLS to RSWL.

Issues related to the Uncontrolled Waste Disposal Sites

Regarding the current situation of UWDSs on the island of Rhodes, the whole sample of respondents (100%) states that they are aware of their existence and that no actions have been taken in order to restore them. Regarding the reasons for the existence of the non-restored UWDSs, the statistical analysis of the data shows that 76.92% of the answers refer to the inertia - obstruction of the Authorities to find solutions, 7.69% to the technical - financial difficulties presented in each case with respect to implementing the restoration and 15.38% declare that the restoration process is in progress. The question concerning the actions of the Agencies for the restoration of the existing UWDSs reveals that in 38.46% of the answers, the implementation of restoration plans and projects is preferred, in 46.15% informing the public and protesting to the responsible authorities, while in 15.38% the actions only concern the submission of proposals to eliminate the problem.

The representatives of the Agencies, in a percentage of 83.33%, state that they are aware of the continued illegal disposal of waste in these areas. In order to eliminate the phenomenon, the research sample suggests the following methods: policing - imposing fines on offenders with a percentage of 38.46%, educating and informing citizens with a percentage of 15.38% and 23.08% respectively, and implementing an integrated waste management solution with a percentage of 23.08%.

Views of the Agencies on the Sanitary Landfill Site

Asked whether they have visited lately the existing SLS, it is noted that 83.33% of respondents have visited it, compared to the remaining 16.67%. Regarding their view of the SLS picture, only 30% are pleased with the current situation, proposing as additional measures to be taken for improvement, the implementation of maintenance projects by 33.33% and the operation of the new cell and of the Material Recovery Facility by 66.67%. Of the remaining 70% of the survey participants who were not happy with the SLS picture, it was proposed for the improvement of the situation: a) the exploitation of biogas and the following restoration of the SLS by 27.27%, b) an alternative waste management by 27.27%, c) a new cell operation by 27.27% and d) 2 other proposals, which correspond to 18.18% of the total number of responses and refer to the better internal organization of the SLS and the addition of machinery, scientific and labor personnel so that it can be operated in accordance with the approved environmental terms.

Regarding the knowledge of the representatives of the Agencies for the collection of the biogas produced in the SLS, as it results from the analysis of the data, the respondents with the same percentages (33.33%) state that the collection is being carried out, the collection is not being carried out and do not know whether any action has been taken in this direction. From the percentage of the sample stating collection is not being carried out, 75% mentions the technical deficiencies and failures that occurred, while 25% the low efficiency of municipal services. Of the percentage claiming the collection is being carried out, 50% does not know whether the projected study on the utilization of the produced biogas was implemented, while the remaining 50% believe it was not implemented due to a lack of political will.

With regard to the disposal of sewage sludge produced by the island's wastewater treatment plants, statistical data shows that 41.67% of the sample states that they do not know, 25% believes that this material is disposed of uncontrollably, 8.33% that it is disposed of in the SLS, 8.33% assume that the material is disposed of uncontrollably in a designated area and 16.67% think that no appropriate action has been taken by the authorities to address the problem. The total number of respondents to the sludge disposal issue (41.66%) reported as potential consequences the contamination - threat to public health and the pollution of the natural environment by 46.67% respectively, and to a lesser extent (6.67%) the risk of a fire occurring.

Views of the Agencies on composting

In attempting to record the views of the investigative sample on the importance of composting, it is found that for 50% of the respondents this action is of great importance, for 25% of moderate, for 16.67% of small and for 8.33% of minor importance. To the question of whether household and municipal composting programs should have been implemented in the municipality of Rhodes, as has been piloted in other South Aegean municipalities such as Halki and Anafi, shows that the overwhelming majority of the sample responds positively by 91.67%. These people argue that in order to implement these programs with satisfactory participation, it is required that citizens must be educated - their mentality must change - and a consciousness must be acquired by (41.18%), it is required that citizens must be informed - and made aware by (35.29%) and it is required that the necessary equipment must be distributed by 23.53%.

Regarding the sample's view of the actions to be taken by the state so that the citizens are informed and made aware of the composting of organic materials, 50% of the respondents prefer information programs, 28.57% prefer incentives, while 21.43% prefer the implementation of the legislation. In the direction of informing and raising the awareness of the citizens, the whole investigative sample (100%) argues that the implementation of Environmental Education Programs could contribute decisively to the provision of knowledge and the formation of an appropriate behavior at a rate of 30.77% respectively and the impetus for decisive action at a rate of 38.46%.

Views of the Agencies on recycling

In attempting to record the views of the investigative sample, with respect to if the authorities are moving in the right direction regarding the separate collection of at least 4 material streams (Paper, Plastic, Glass, Metals), it is found that all respondents (100%) answered negatively. Regarding the implementation of a "sorting at source" program, 91.67% of the individuals agreed, while 8.33% said that the implementation of such programs will not have any results if they are not accompanied by an organized recycling program. The percentage of the sample stating an acceptance for the program supports as a prerequisite the satisfactory participation of both households and professionals, i.e. the large organic waste producers such as hospitals, hotels and restaurants. In this case it is proposed that the appropriate equipment be provided, in particular buckets and collection bags, alongside financial incentives to citizens in order to participate in one of these programs, by 57.14%, informing and aware people by 28.57% and the voluntary participation of citizens by 14.29%.

Asked whether they are happy with the course of the recycling process on the island of Rhodes, the highest percentage (91.67%) responded negatively and only 8.33% of the sample responded positively, substantiating its view that recycling of materials other than MSW, such as electrical appliances, batteries, frying oil, mineral oils, tires, cars etc. takes place. On the other hand, 91.67% of the sample, which is not satisfied with the degree of recycling that is being implemented, argues that the following steps are needed to increase it: a) information and awareness of citizens by 31.58%, b) educating citizens by 10.53%, c) infrastructure and systems of alternative management by 31.58%, d) alternative management actions by 15.79%, including the collaboration with the private sector and the provision of financial incentives and e) implementation of the legislation by 10.53%.

Investigating the knowledge of the samples respondents regarding the delay in the start of the construction works of the Material Recovery Facility, despite the great importance and necessity of the specific project for the management of MSW on the island of Rhodes, it is noted that 16.67% are not aware. 83.33% of the respondents claim to be aware that the reasons for the delay are due to the obstructiveness being the responsibility of the Municipal Authority by 50%, due to the time-consuming obstructiveness being the responsibility of the central authority by 16.67%, and due to the time consuming procedures in order for the execution of public works projects under the existing legislation, by 33.33%.

Views of the Agencies on integrated solid waste management and the transition from Sanitary Landfill Sites to Residual Solid Waste Landfills

From the allotment of the frequency of the replies by the representatives of the Agencies regarding their views on whether actions have been taken to promote policies towards an integrated MSW

management system incorporating prevention, reduction, sorting and re-usage, it is ascertained that 58.33% believe that actions have been taken while 41.67% responded negatively. The percentage of the sample that responded positively suggests additional actions should be taken towards an integrated solid urban waste management system. The following suggestions are derived by categorization: a) informing and making citizens aware in order to encourage them to actively participate in and take actions, by a percentage of 22.22% of the total of the proposed actions b) recycling of the materials which will be accompanied by the collection of waste at the source and the provision of the necessary number of recycling bins, by a percentage of 55,56% and c) operation of the Solid Waste Management Body, which remains inactive, with the simultaneous implementation of the approved Regional Waste Management Plan, by a percentage of 22,22%. Correspondingly, the percentage of the sample that responded negatively suggests as effective actions - policies, informing and educating citizens, by a percentage of 60% and the undertaking of actions by the authorized Agencies with the simultaneous implementation of the approved Regional Waste Management Plan, by a percentage of 40%.

Regarding which would be the best way of integrated management of MSW for Rhodes, 83.33% of respondents of this study believe that the management should include: sorting of MSW at the source, thereafter transport to the Material Recovery Facility, whereby a further sorting of the recyclable materials will be implemented mechanically, recovery of materials through recycling, composting of the organics and finally disposal of the residue in RSWL, 16.67% of the sample suggest that the best way of managing should include sorting at source and then combining Material Recovery Facility and energy recovery either by methane generation (bioreactors) or gasification or by total combustion. And in this method the residue will be diverted for final disposal to RSWL. In attempting to record the sample's view of the worst way of managing, 41.67% report the uncontrolled disposal (UWDSs), 33.33% consider the existing type of management SLS, 16.67% report combustion due to the uncontrolled by-product production and 8,33% report composting due to the production of high-cost and low quality material that cannot be placed on the market.

Regarding the achievement of the quantitative targets for the reduction of the biodegradable MSW by 2020 as they are binding on the basis of the EU Directive 1999/31, the statistical analysis of the data shows that 75% of the research sample considers that these targets will not be achieved, 16.67% considers they will be achieved and 8.33% say they do not know. 50% of the people that answered positively, believe that this will be achieved by either sorting at the source, recycling and then recovering energy with bioreactors and gasification or total-mass combustion. The other 50% argues that the targets will be achieved through the implementation of the Regional Waste Management Plan, after it has been reviewed and with the simultaneous activation of the Solid Waste Management Body. Regarding the reasons why the Solid Waste Management Body of the South Aegean Region is not yet fully operational, the respondents attribute this to the indifference and lack of political will, by a percentage of 56.25%, to the organizational and planning problems, by a percentage of 31.25% and the remaining 16.67% declares that they do not know the reasons.

To complete the interview, the survey participants were asked the question of if they wanted to add anything to the subject. 26.67% said the issue was fully covered. From the codification of the answers of 73.33% of the sample, it is accrued that a percentage of 33.33% say that a comprehensive waste management plan is needed with the parallel participation of the Agencies, the private sector and the citizens. A percentage of 20% of the sample, highlights the necessity of education and information for citizens on waste management and 20%, highlights the need for a revision of the Regional Waste Management Plan and a substantial implementation of the legislation.

Discussion – conclusions

The survey data shows that the representatives of the Agencies are aware of the current situation of the UWDSs on the island of Rhodes and of the continuing illegal disposal of waste where these sites have not yet been restored. From the sample, those directly involved in taking decisions and dealing daily with the management of waste, politicians and officials of the Municipality of Rhodes and the South Aegean Region, declare that they are active in the effort of implementing measures, planning and in restoration projects for the existing UWDSs. Accordingly, the non directly involved participants -the Technical Chamber, the Association of Designers of Public Works of the Dodecanese, the Aegean University, the Environmental-Friendly Organizations, the Private Enterprises- declare that they are directing their actions in order to submit proposals for the immediate restoration of the sites, to inform the authorities of the negative effects to the environment and the fines given to the Municipality by the European Court of Justice, and at the same time they protest to the authorities for the obstacles regarding the solution of the problem. The divergence of views that can be observed is possibly due to the fact that those responsible for the operation of UWDSs see the situation in a more positive manner than the external observers-evaluators. This data indicates the slow pace with which this issue is dealt with and the inefficiency or inadequacy of action by politicians and officials.

Regarding the disposal of sludge produced by the Rhodes Wastewater Treatment Plants, most people either do not know or have a wrong impression. These findings require further research in order to find out the causes of this inadequacy regarding both knowledge and basic information with respect to the involved parties, although its hazards to both humans and the natural environment are known.

On the issue of the management of organic matter, it is stated that composting is required under the integrated management of MSW. For the implementation of composting programs in Rhodes, the overwhelming majority believes that they should be implemented, as piloted in other islands, under the supervision of the South Aegean Region. To ensure adequate citizen participation in meeting this goal, participants point out that citizen education, information and awareness must be prioritized so as to change their mindset and in order for them to acquire an environmental awareness.

With regard to the separate collection of at least four material streams (paper, plastic, glass, metals), it is noted that no substantial action has taken place despite the obligation to comply with the European Directive 2008/98/EC for Waste⁴. The overwhelming majority of participants state that they are disappointed with the degree of recycling that is being carried out, as recycling is limited to fragmentary or individual actions of collecting recycling materials and transporting them to alternative management systems operations mainly located in Athens. Actions necessary to increase the degree of recycling, apart from educating, are stated as informing and raising the awareness of the citizens, infrastructures, systems and alternative management actions. Despite all these points, the actions of the Agencies are limited to making proposals and protesting to the decision-makers and policy-makers. Perhaps the suggestion stated in this study with respect to providing financial incentives to citizens and the collaboration of the Local Government with the private sector may bring about a change in the existing situation.

The responsibility for the delay in implementing the Material Recovery Facility, is largely attributed by the respondents, to the actions of the Municipal Authority and to the lengthy and time delaying procedures for the implementation of public works on the basis of the applicable legislative framework. This data highlights the problem with the over complex legislative framework that delays the implementation of public works and private investments even if they concern the environment.

Summarizing the findings, the need for a comprehensive MSW management plan with the involvement of the private sector, in full collaboration with the Solid Waste Management Body, is highlighted in order to address the chronic pathogens and obstructiveness of the public sector and to promote solutions towards a sustainable management under the supervision of the authorities, the effective implementation of the legislation and the active participation of the citizens. Information, education and awareness of people with the contribution of Environmental Education could act as a trigger for collective actions in order to protect the environment and its sustainability.

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⁴ Framework Directive 2008/98 / EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives. Official Journal L 312 of 22.11.2008.

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