

**Preliminary Proposal for a Household Hazardous Waste Management Program,
for the City of Hermosillo, Sonora, Mexico.**

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A study was conducted in year 2000, reviewing the Mexican Regulation for environment protection and the household hazardous waste (HHW) management programs developed in different cities of the United States, with the objective of design a preliminary proposal for a program based on a multiparty work between the local Government, Universities, private sector and community as well.

The program was considered as a tool to prevent the indiscriminate disposal of HHW, and also include, as a key part for the program success, the development of an Environmental Education Program and the introduction, through it, of concepts such as sustainable development, pollution prevention and cleaner production in the different participant sectors. The overall project was also evaluated under the scope of sustainability; with the purpose of generate a product that indeed bring benefits for the environment, and to the cultural, social and economic components as well.

The preparation of this project allow the authors the possibility of characterize the factors that challenge the projects of the kind in Countries and Cities with limited capacity, in terms of economics and technical development. The most important factors identified were: Economics, this factor affected the project definition due the fact that there are scarce programs focused in supporting those projects addressed to pollution prevention under the scope of the sustainable development. The lack of effective relationship between the academic and research institutions, and from those with governmental institutions, affects the research process for accurate and fair information, relevant for this type of projects. In addition, the lack of basic research, in Countries such Mexico, on this matter limit the good achievement of settled goals for the research.

One constrain found during the development of the project was the lack of support mechanisms for academic research for students in graduate level in the sustainable development field; this supports are essential for the quality of the basic research and for the implementation and test of the findings.

Introduction.

According to the Mexican Code of Environmental Regulations (CER - Ley General del Equilibrio Ecológico y la Protección al Ambiente – amended in 2001), the regulation of the Hazardous Wastes (HazWas) belongs to the Federal Government through out its different Agencies: Environmental (SEMARNAT), commerce and industry (SECOFI), health (SSA), communications and transport (SCT), energy (SE), Secretary of State, and Navy. The CER comprises the use, collection, storage, transportation, reuse, recycling, treatment and disposal.

As a complement of the CER, an Act and Standards specifically created to establish the conditions under which the HazWas should be handled. This CER indicates that Municipal and State Government, may participate as support bodies of the Federal Government on the enforcement and surveillance of the current legislation. This supporting role will be regulated through the issuing of several agreements.

It is considered that there is a legal and technical failure in the CER, due to the fact that the Household Hazardous Wastes (HHW) are not included in the collection and treatment programs created for the industrially-generated HazWas. Due to this, the HHW are sent to the city landfill with the general refuse, or, in the worse case scenario, to clandestine wastelands or sewage.

If we consider the presence of grassroots movements in the City of Hermosillo, and in the State of Sonora. Most of which, born to fight for the closure of an industrial waste landfill (owned by the Spanish company TECMED) and other suspected polluters in the State. It will be expected that the community as a whole will have a strong pro-environment conscience, but there is not.

The late is confirmed because, on a daily basis an unmeasured weight of hazardous wastes can be found mixed with the municipal refuse, such wastes range from paints, solvents, wasted oil, solvents, chemical substances, to expired medicines, used syringes and so. Such wastes are being generated by the community, not businesses, industries or the like. It seems that this conditions is similar on the majority of the cities in the Mexican Republic, and Latin America as well. So far only in the US, Canada and some countries of the EU and Asia, a different number of strategies have been established to deal with this issue.

Despite the fact that the inhabitants of Hermosillo, do not constitute a pro-environment community, as a whole. The fact that there are grassroots movements at different levels, and that there is an open participation from the City and State government and local companies to deal with environmental problems. It is considered that there are the necessary elements to establish and run a program aimed to the adequate management of the household hazardous wastes.

The proposal included the following objectives:

- The design of a household hazardous waste program for the city of Hermosillo, Sonora.
- The development of Environmental Community Program, aimed to educate and create an environmental awareness about the risks associated with inappropriate handling of hazardous materials. Also to reduce the consumption of such materials, and to introduce the Sustainable Development principles.
- The identification of the entities who will be involved in the program administration. These entities are local Government, Universities and research institutions, environmental NGO's, the community through its Neighbors Committee, local businesses, and waste management companies established in the state.

It is not the purpose of this paper introduce the lector to the technicalities of the HHW program; but only its generalities just to have a clear idea of what the proposal was. Instead, the actual objective is to expose the problems that the research team went through during the preparation of the proposal.

Background.

The environmental pollution world wide due to the human development, has brought a regulatory response from the Government on each country. Sometimes this response is a very weak one. In the case of the HazWas, the attention has been addressed to primary and secondary activities. This is done, because these activities have been considered has the main source for negative impacts to the environment and the socioeconomics.

Specifically in terms of HazWas management, in general the policies and regulatory framework have an “end of pipe” approach, but all the attention is given to the big industry. No attention is given to small- and medium-sized enterprises (SME’s). This is the same situation for households as well, where most of the products used contain chemical substances, that receive great attention when handled at industrial and commercial level, yet no regulation exist to control the use of the same substances on a household.

Unfortunately, no studies or data are available to estimate volumes of hazardous materials stored in a household, or that are deposited in landfills¹. In addition, this type of facilities are not designed to receive HazWas, and there is a major risk for underground water contamination². The available alternatives start with separation at the source, materials reuse and recycling. This should be done preventing the occurrence of more impacts, and also reducing the generation of wastes.

Although in the US there are no regulations issued for the HHW, the Government and industry have been coordinating efforts to diminish the production and the consumption of products containing hazardous materials, through the substitution of such materials with less hazardous alternatives. When there are not safer options available, the communities implement HHW management programs, which benefits vary by City, but do include the following:

- Health and environmental risk reduction, when the HHW are handled properly.
- Reduction in the need for the declaration of “brown fields” in the city, and its consequent restoration.
- Increases the community awareness for health and environmental risks associated with HazWas.
- Increases the understanding of HHW management.³

Starting in 1980, the programs of the kind reached 3,000 distributed in the 50 States in 1991. Besides the similitude in objectives, the programs also share other characteristics such as, an environmental awareness program. Most of the programs started with a single event per year,

and this was considered the first step in the path to educate the community and reduce the risks associated with the HHW⁴.

It is important to state here that a significant portion of the proposal was based on different programs of the US, but considering the limitations of the City of Hermosillo some changes were introduced. This was due to the difference in technical and economical capability of the City Government.

Project Methods.

There was no specific methodology to follow during the design of the proposal. Although the following activities, were considered important for the development of the program:

1. Identification of the Program needs.

This was done using the Manual for HHW from EPA⁵ the US, also were considered the reports and published programs from the following cities: Raleigh, NC, Monroe County, NY and Auburn⁶, ME, as well as the programs implemented in New Hampshire and Texas⁷.

The information contained on those reports and programs was adapted considering the following conditions in the City of Hermosillo: community participation, grassroots movements, Mexican Code of Environmental Regulations, economical and technical capacity of the City Government, Universities and research institutions in the State, and the presence of companies technically capable of provide the management of the wastes.

2. Identification of the environmental information needed.

In addition to the technical information collected from the reports, an important section analyzed was the outcomes of each program. Special attention was given to problems faced during the promotion of the program, this is media participation. How the programs operators identified the target sectors for education, how to implement the informative sessions, which media are more useful, how the information should be given, in what order, and so.

It was considered important to target also the administration committee for the HHW program, so they understand the international policies and principles for sustainable development.

3. Design of the Program operation.

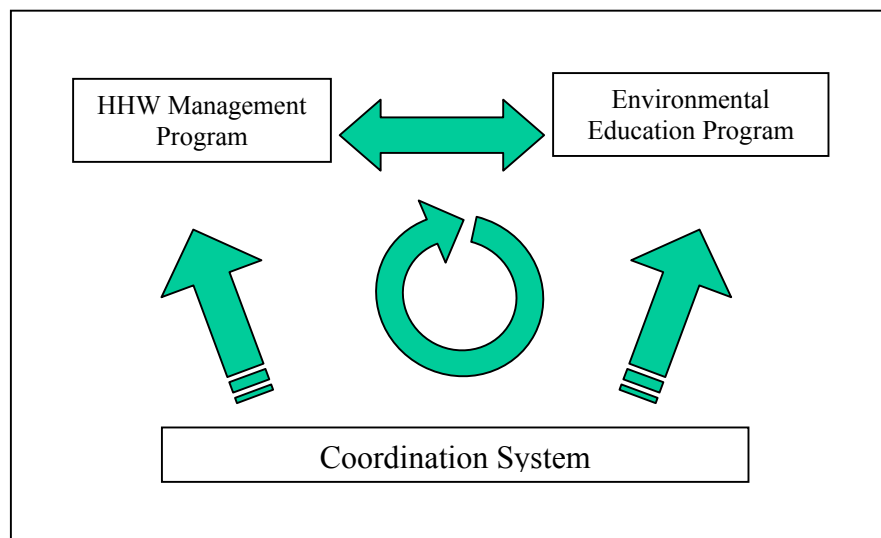
Once the two previous sections were defined, a draft of the program operation was conducted. Three major groups were considered as a key elements of the Program Committee: Universities, waste haulers, City Government.

Each of this groups was awarded specific tasks and responsibilities, and some benefits were also identified.

HHW Program Description.

The purpose of this section is only to outline the major components of the Program, so the reader can have a perspective of it and how was planned to be implemented.

The Program is composed of three important elements: a Coordination System, the HHW Management Program, and an Environmental Education Program. Each of these elements had an important role for the success of the Program, but above all the Coordination System is the basis and structure over which the other two elements will be implemented. The following scheme represents the linkage between each of the elements.



The Coordination System

To have a legal basis for the Coordination System (CS), it is necessary to establish legal agreements between each one of the Governmental levels, in order to give to the City Government the legal power required to supervise the adequate management of the HHW. Through this agreement, the City Government will be able to develop a more collaborative relationship with key groups among the community.

The groups among the community that are necessary for the success of the Program are, besides the local Government, local waste management companies, academic and research institutions, environmental NGO's and community grassroots groups. All of them share almost the same characteristics that the program is needing: basic knowledge and experience in the environmental area, particularly in pollution control; at different levels the technical and economical capacity to participate in the Program. The specific areas of expertise and capability that each group will provide are detailed in the following table.

Group	Areas of Expertise and Capability
Waste Management Companies	Had the infrastructure and technical knowledge and resources to conduct the transportation and final treatment/disposal.
Academic and Research Institutions	Had established relationship with national and international institutions. These relationship will provide the Program with the opportunity to reach state of the art technology and knowledge.
Environmental NGO's	Since these groups comprise a great variety in individual backgrounds, they truly represent the different groups of the community, therefore they input during the Program planning will have more social and environmental benefits.
City Government	It represents the legal structure of the Program and can provide with incentives for each of the members to gain their will to participate.

The responsibilities and incentives that the City Government can provide to each of the groups should be clearly stated on the legal agreements to be signed. Indeed these agreements will be thoroughly revised and negotiated before the Program can be on effect, but the benefits for the city, the population and the environment will be substantial.

HHW Management

Based on the reports and studies from other Programs in the US, we had important information regarding the wastes that can be expected to be found mixed with the general refuse. Of course it is important to determine which of these wastes are present in the Municipal Waste of the City of Hermosillo. These determination will allow the prioritization of those HazWas that constitute a major danger. The elements to be considered to reach the decision to prioritize the HazWas will be based on its chemical composition, amount generated per day, and effects to the health and environment, among others.

Here the waste management company will be of vital importance, because of its experience on waste handling. Also, they will help on the development of the technical logistics for the Program. Some of this information will be used during the preparation and implementation of the Environmental Education Program.

As part of the logistics of the HHW management, and considering the experiences obtained in the Programs running in the US, it is considered necessary to develop the specific steps for the following topics: define the collection type (single/multi site); frequency (once a year, bi-annual, monthly), location and size of the collection site, as well as its operation logistics; finally, and considering the type of waste(s) to be collected, the final treatment/disposal option will be decided.

In addition to the planning and logistics of the Program operation, the training of all the personnel involved in the implementation of the waste management at the site. This training must consider: use of PPE, waste management, emergency response procedures for eventual spills, common dangers during the waste handling.

It is important to mention that, even though a major participation of City employees, university staff and students, and NGO's members as well, the actual handling of the waste will be the solely responsibility of the waste management company. The fact that these participants are involved in the training, will reduce risk during the event due to an increased awareness of the attendants; also, they will serve as a "by word of mouth" distribution of the importance of the HHW Management Program.

Environmental Education Program

This Program should be a permanent channel to generate an awareness about environmental protection, and the potential effects on human health if this is not accomplished. In addition, this education program may be the first step to reach other subjects of great concern. The target groups for this program are: the CS members, households, and SME's.

For households and SME's, the program should make emphasis on HazWas management at first, and also on environmental consumption. These two groups are an important and unaccounted source of dangerous goods consumption. Thus, the planning of the environmental education program (EEP), as well as the planning of the HHW management, should be integrated with a focus towards toxics use reduction.

The information provided with the EEP should range from: hazardous materials on household products, pollution effects, environmentally friendly alternatives, purchasing, adequate use of household products, product handling, storing and disposal. In addition the EE program, can be used for advertising the collection event, provide details about each activity on it, and other important information.

Here the media will be important, through newspapers, radio and TV, it will be easier to reach the community. In addition, other important communication media should be implemented: informative telephone line, mailing notices, street advertising, neighbor committees, and so.

About the CS members, although they have an interest on environmental issues, their professional and academic background represents a barrier in communication, this is due to the different levels on knowledge. At this point it is necessary that the CS be the first one in being trained on the program components and in environmental concepts related to it: dangerous goods, hazardous materials, sustainable development, cleaner production and pollution prevention.

Experiences learned.

Whether the HHW Program works or not, is still an unanswered question, different reasons drove off the planning process. Even though, the experiences learned by the research team, during the project development, were very enlightening in terms of what is needed for the fully accomplishment of objectives and aims on this type of projects on the Mexican Universities.

Economics was the most important factor that affected the project definition due the fact that there are scarce programs focused in supporting those projects addressed to pollution prevention under the scope of the sustainable development. Although the project proposal was presented under the scope of a Graduate Program research, the Department did not had at that time specific opportunities to fund the projects presented.

There was at least, a public organization that was willing to support those projects and investigators that were not part of a private company. The economic support did not implied a monthly stipend, nor school tuition/fees payment, the purpose was to reimburse some of the expenses of the project, but up to a certain amount.

Also, the lack of effective relationship between the academic and research institutions, and from those with governmental institutions, affects the research process for accurate and fair information, relevant for this type of projects. When the project was first presented, included an exhaustive review of the data base of SME's that were registered as HazWas generators, under the Mexican environmental regulations.

To access this data base an informative session accompanied with a commendation letter from the Chair of the program was held with the Sub-delegate for Environmental Protection, at that time he granted his permission. When the time comes to conduct the review, he refuses to allow us the use of the information without further explanation. If the relationship between the University and the SEMARNAT were strong and based on a signed agreement, the access to information would be more easy.

In addition, the lack of extensive basic research, in Countries such Mexico, on this matter limit the good achievement of settled goals for the research. The main objective of the project was probably to big to be achieved in the timeframe stated for it. But the environmental statistics, publicly available from the Mexican bureau of statistics, do include this information, or at least were not found. Also, there is not available a data base in which we can track all the information that has been published from the Mexican researchers, there are in fact clusters of information on every University, but accessing it is not always easy.

In conclusion, conducting basic research as a student in undergraduate and graduate level at the Mexican Universities is, as someone stated, a *via crucis*. This is driving the students to avoid any kind of activity related with research. The experience is not always good, and only few students follow this track. Only PhD's and ScD's receive funding from the government grants and institutions to conduct research, and sometimes this is limited to a extent in which not even they are able to provide some kind of support for they research assistants.

A profound change in the Mexican research program should be implemented, if the Country wants to be part of the "big league".

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- ⁴ See Reference 3.
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