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National Implementation Plan for the Stockholm Convention

Persistent Organic Pollutant (POPs) Management in Costa Rica



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National Implementation Plan for the Stockholm Convention

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PREFACE

In the year 2006, the Ministry of Environment, Energy and Telecommunications (MINAET) took on the responsibility of being the National Authority in charge of implementing of the Stockholm Convention for Persistent Organic Pollutants.

The Convention was signed by Costa Rica in August of 2006 and ratified in November of the same year, as executive decree No. 33438. In this form, our country became part of the efforts that approximately 146 countries have been developing for the proper management of the persistent organic pollutants (POPs).

In this framework, the process for the elaborating of the National Implementation Plan for the Management of Persistent Organic Pollutant was initiated in our country. The Technical Secretariat for the Coordinating of Chemical Substance Management was created for this purpose. This secretariat has representatives from many different sectors.

This document is the product of collective and participative efforts from many diverse stakeholders, among which it is important to highlight the universities, institutions, communities and companies (ICE, CNFL, Coopelesca, Coopesantos, Copeguanacaste, among others). During these two years an important number of people have participated, and who in one way or another are the authors of this proposal.

After having completed the National Inventories for Persistent Organic Pollutants, to determine the existence of these substances, the information was presented to several sectors and discussed and in an effort for public awareness on the topic, the bases were built for the present National Implementation Plan (NIP).

This NIP has six action plans for the topics of Polychlorinated Biphenyl (PCBs), the generating of dioxin and furan emissions, the existence of POPs pesticides and outdated, and in the topics of Institutional, Judicial, Public Awareness and Communication strengthening among the population.

Among some of the actions that are proposed is a PCB transfer station with its elimination, the National Information System, the strengthening of the analytical capacity, and the development of the necessary legislation for the different types of COPs among others.

To make these fundamental actions a reality for the fulfillment of the Stockholm Convention, is a milestone that requires the interest and commitment of many. Once again it is about a task to be completed among many, to which we are inviting to contribute in your possibilities and expectations.

Moving forward toward sustainable development is the goal of all environmental proposals, and it is only possible if we united efforts around common interests. And without a doubt health and the protection of life in all of its forms, is an interest that we all share.

National Implementation Plan of the Stockholm Convention for Persistent Organic Pollutants (COP's) Management in Costa Rica

Executive Summary

The United Nations Environment Program (UNEP) aware of the necessity of implementing global measures to prevent adverse effects caused by persistent organic pollutants in all states of their life cycle and having in mind the 19/13C decision of February 7th 1997, of initiating international activities to protect human health and the environment with measures to reduce and/or eliminate emissions and persistent organic pollutants unload, within the framework of relevant dispositions of the Rio Declaration about the Environment and Development and Program 21 promoted the signature of the Stockholm Convention.

This Convention signed by the parties has as objective to protect human health and the environment from persistent organic pollutants. For the Convention purposes: "Party" refers to a State or organization of regional economic integration that has agreed to submit to the obligations established in the present Convention and in those in which the Convention exists.

Persistent organic pollutants (POPs) are organic compounds they are usually halogenated compounds and in most of the cases chlorinated with toxic properties, resistant to photolytic, chemical and biological degradation. They characterize for having low water solubility, and a high liposolubility which lead to bioaccumulation in the adipose tissue for what they tend to be in the different links of the food chain. Due to their capacity to bioaccumulate, and of stay inside living beings for long periods, these substances are capable of producing series of adverse effects in different organs and systems, and of increasing the risk of pathologic processes. They are also semi volatile, feature the allows them to move long distances into the atmosphere before their decomposition, transported by water, air, and migratory species through international borderlines and deposited far away from the place of their release, and accumulating in land and water ecosystems.

Even though, there are many different forms of POP's, either natural or artificial, the ones that stand out for their persistent and bioaccumulation features, and have been labeled as "the dirty dozen" include 9 first generation organochlorinated pesticides such as: aldrin, dieldrin, DDT, endrin, chlordane, mirex, toxaphen, and heptachlor that have insecticidal action, and the hexachlorobenzene with fungicide action, and several chemical products among them the polychlorinated biphenyls (PCBs), or non-intentioned secondhand industrial products like the polychlor-dibenzo-dioxins (dioxins), and the polychlor-dibenzo-furans (furans).

In August 2006, Costa Rica approves the Stockholm Convention about Persistent Organic Pollutants through law 8538. Three months later, in November of that same year, the Convention is ratified by the executive decree 33438. From that moment on Costa Rica becomes one of the parties of the Stockholm Convention acquiring the commitment of creating an National Implementation Plan (NIP) that describes how the established obligations by the Convention will be carry out.

National Implementation Plan for the Stockholm Convention

Methodology used during the creation of the National Implementation Plan of Costa Rica is the one marked by the GEF in the “Guide for the Development of an Application National Plan of the Stockholm Convention” in which it is subdivided into several phases:

- a) Establishment of the Process Coordination and Organization Mechanism: Direction for the coordination of the Management of chemical substances made up of an interinstitutional team with participation of the government, and private sector, civil society and NIP Project Coordinator. The coordination and elaboration of the NIP had especially the determined support of the Ministry of Environment, Energy and Telecommunications, Ministry of Labor and Social Security, Ministry of Agriculture and Livestock, Treasury Department Laboratory, members of the universities and investigation centers, NGO's
- b) *POCs Inventory Elaboration and Infrastructure Evaluation and National Capacity:* a National Inventory of Persistent Organic Compounds was developed and it was divided into the following topics, entrusted to technical groups specialized in every subject, leaded by a national professional. Also, complementary strategies related to communication and handling of the information was developed. The studies are described below

Study	Date	Objective
1. National POPs Pesticide Inventory	July 2007	To identify and quantify nationwide the places and amount of POPs pesticides and obsolete ones. ¹
2. National PCBs Inventory	November 2007	The main objective of this inventory was to estimate the amount of existing PCBs in the country to determine immediate measures of operation and future labor priorities to perform the correct final disposal of these compounds. For this inventory purposes, the equipments with concentrations higher than 50ppm ² are considered polluted.
3. National Dioxins and Furans Inventory	January 2008	To establish a guideline that refers to nationwide dioxins and furans releases. To determine the sectors that present major releases to make a priority necessary actions for the formulation of the National Implementation Plan (NIP) about POPs, complying with the Stockholm Convention ratified by Costa Rica in November 2006. To contribute with the database improvements to get centralized and pertinent information that facilitates future quantifications. ³
4. Laboratories Installed Capacity Diagnosis	August 2007	The objective of this inventory was to analyze the analytical capacity of nationwide

¹ Fournier, M.L., Ramírez, F. y Ruepert, C. (2007) Final Report. “POPs and other obsolete pesticides in Costa Rica Inventory” IRET Regional Institute of Toxic Substances Studies. Universidad Nacional. DIGECA. MINAE

² Alfaro, C. (2007). Final Report. Polychlorinated Biphenyls Inventory. PCBs. Universidad Nacional DIGECA. MINAE

³ Quesada, Romero y Roa (2008) National Dioxins and Furans Inventory. Costa Rica. Stockholm Convention about Persistent Organic Pollutants POPs. Faculty of Chemistry, Instituto Tecnológico de Costa Rica DIGECA. MINAE

National Implementation Plan for the Stockholm Convention

		laboratories dedicated to the analysis of Persistent Organic Compounds (POCs) ⁴
5. POPs National Profile	November 2007	A National POPs Profile was completed to evaluate the existing capacity for the management of chemical substances including the ones in the Stockholm Convention.
6. Design and implementation of socioeconomic evaluation for the development and implementation Stockholm Convention action plans	February 2008	A socioeconomic evaluation considering UNEP guideline was designed and implemented in sectors or social groups that might be affected by persistent organic compounds impact. Are considered as direct interested ones: representatives of the government specifically MINAE, Health Ministry, Treasury Department, sugar mills from the zone of Grecia, Grecia community leadership, pineapple producing industries, community leadership of the Caribe zone and Norte zone, metallurgic sector industries, electricity generation industries, institutions and industries that had POPs pesticides and expired bottles ⁵ .
7. Identification of key agents points of view for POPs generation subject matter	March 2008	The objective of this study is to identify the knowledge level and points of view of different agents involved in cane burning subject matter in the Guanacaste province where they are huge crops. ⁶
8. Design and beginning of the implementation of a system about POPs information	January 2009	The design of the POPs information system has as objective to permit the generation, storage and analysis of the information related to POPs as well as, site access by links as BAT/BETs. Information is the basis that enriches proper management of chemical substances in general and in this particular case POPs and the fact that it is within interested reach of the different sectors makes it a priority interest system for the country for what a consultant team was hired ⁷ that based on a study of the characteristics and requirements proposed designed the POPs information system and begin its implementation in January 2009
9. Communication Strategy (May 2007, September 2007 and December 2008)	May 2007 September 2007 December 2008	As process support, and with the purpose to establish the POCs subject matter, a team of professionals in coordination with MINAET and NIP general coordinator created series of massive communication products, such as: videos pop-ups and leaflet, poster, commercial

⁴ Alfaro, C. (2007) Evaluation of the existing capacities and infrastructure for the analysis of Persistent Organic Compounds POCs.Faculty of Chemistry Universidad Nacional DIGECA. MINAE

⁵ Arroyo, H. Marín, M, Solé, E. y Lobo, S. (2008) Design and Implementation of the Socioeconomic Evaluation of POCs Management.Final Report. MINAE, DIGECA, ACEPESA.

⁶ Montero, D y Gaete, M. (2008) Montesol. S.A. Identification of key agents points of view for Persistent Organic Pollutants from cane production in the Guanacaste providence. DIGECA. MINAE

⁷ NExt Soft consultores. POPs Information System Design 2008- January 2009

National Implementation Plan for the Stockholm Convention

		break among other that were spread through television, radio, activities of the direction, and during the World Environment Day.
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This diagnosis process allowed to better define the situation referring to stock and POPs operation in the country as well as the perception of key agents. In chapter IV, there is a summary of every inventory.

c) *Priorities Evaluation and Objective Setting:*

For the definition of priorities, a first workshop with members of the Technical Secretariat for Chemical Substances Management took place. In it, every technical group presented the results of the diagnosis about PCBs, POPs pesticides, Dioxins and Furans, POPs analysis laboratory capacity. The participants realized an analysis and validation job based on an instrument designed for this purpose and defined the priority for every action in every subject matter area. Afterwards, the second workshop took place with professionals in the analysis subject matters in which they worked with the priorities defined in the previous workshop, priorities were evaluated, specific objectives were established and the products to be obtained in each case were defined.⁸

The main objective of the National Implementation Plan of Costa Rica is: to protect human health and the environment from Persistent Organic Pollutants in Costa Rica in the implementation of the Stockholm Convention framework with these priority issues.

- a. PCBs pollution control,
- b. Decrease and control of dioxins and furans releases in Costa Rica
- c. POPs pesticides elimination

In order to accomplish the objective 6 priorities work areas were defined:

1. Legal Strengthening
2. Institutional Strengthening
3. PCBs Management
4. Pesticides Management
5. Dioxins and Furans Management
6. Public awareness, communication and participation

And 2 transverse areas:

1. Analytical Capacities Strengthen
2. Development of a National POPs Information System

d) *National Implementation Plan Formulation and validation* with key agents involved. Based on the priorities defined and on the objectives proposed for each subject matter, the action logical frameworks were created and they were analyzed in the workshops with key agents. Afterwards, the National Implementation Plan was implemented and validated through a

⁸ In the final report Evaluation of Priorities for the National Implementation Plan, the description of the process, instruments and defined priorities with their objectives and products are included, as well as, the validation workshop participants

National Implementation Plan for the Stockholm Convention

workshop. For the development of the action logical frameworks, during a workshop with the key agents, they had the consultancy of Dr. Sarah French, expert for the Centre for International Development and Training (CIDT) of the University of Wolverhampton. In December 2008, a National Implementation Plan logical framework validation workshop took place.

The objectives for each area are described below. In Chapter IV the complete action plans are presented.

Action Plan	Objectives
1. LEGAL STRENGTHENING To have a proper legal framework to comply with the stipulated in the Stockholm Convention	<ol style="list-style-type: none"> 1. To establish a national policy leaded by the MINAET in coordination with the Health Ministry for the integral management of chemical products and their residues in the country 2. To create legal instruments related to the management of existing POPs and residues generated 3. To establish a policy of instrument and economic incentives, of recognition or other for the adequate management of chemical substances in general and especially POPs
2. INSTITUTIONAL STRENGTHENING To have an appropriate and strengthen institutional framework to comply with the stipulated in the Stockholm Convention	<ol style="list-style-type: none"> 1. To strengthen, within the Technical Department, intersector coordination for an integral management focused in the life cycle of chemical substances 2. To strengthen the capacities to supervise and to follow up the safe operation of dangerous chemical substances. 3. To establish a POPs National Information System that permits: <ul style="list-style-type: none"> - updates of the inventories by statements of the generators - access to BAT and BET information and inventories and localization of POPs stocks - generation of reports for analysis control and stocks decrease monitoring and management in general of chemical substances
3. PCBs MANAGEMENT To prevent and decrease pollution environmental problems and health problems generated by electric equipments and oils containing PCBs in the country, eliminating PCBs stocks in a safe manner and adequate and identifying polluted places.	<ol style="list-style-type: none"> 1. To develop and update legislation with clear norms for the adequate management of PCBs and related residues. 2. To develop action plans and protocols for the operation and elimination of equipment with PCBs according to the norm. 3. To establish temporary stocking infrastructure. 4. To train and inform. 5. To strengthen the analytical capacity. 6a To provide the adequate final disposal to equipment with PCBs Medium term 6-10 years 6b. To provide the adequate final disposal to equipment with PCBs 6. To identify and characterize the places polluted with PCBs. 7. To develop criteria to select methodologies and procedures to repair the places polluted with PCBs
4. POPs PESTICIDES MANAGEMENT To decrease environmental pollution and health problems derived from inappropriate	<ol style="list-style-type: none"> 1. To define policies and intersector plans of expired pesticides management and of packages including methodologies to prevent the generation of expired pesticides. 2. To establish temporary stocking infrastructure 3. To control and supervise the import of prohibited pesticides including POPs.

National Implementation Plan for the Stockholm Convention

Action Plan	Objectives
management of existing POPs pesticides and obsoletes.	<p>4. To provide training to the emergency and natural and technological disaster attention brigades about pesticides operation in emergency situations.</p> <p>5. To develop action plans to eliminate expired pesticides promoted by the Secretary in coordination with MAG, Health Ministry and MINAET.</p> <p>6. To develop educational and informative campaigns about risk decrease in pesticide operation.</p>
Medium term 6-10 years	
	<p>1. To identify and characterize the places polluted with PCBs</p> <p>2. To develop criteria to select methodologies and procedures to repair the places polluted with PCBs</p> <p>3. To develop required measures to minimize negative social impacts on pesticide management.</p>
5. DIOXINS AND FURANS MANAGEMENT	
To decrease environmental pollution and health problems derived from unintentional generation of Dioxins and Furans.	<p>1. To develop and implement environmental management methods integrating prevention and control of pollution especially non intentional dioxin and furan releases.</p> <p>2. To develop a database and information analysis of unintentional releases of dioxins and furans and their sources, by sector in the country, with supported information that might be incorporated in the POPs database.</p> <p>3. To develop alternate technologies to minimize POPs releases and their effects on the environment and human health.</p> <p>4. To develop pilot plans that permit research and implement, by sector or productive activity, the best available techniques that are feasible for the situation of the. Projects specifically in:</p> <ul style="list-style-type: none"> d. Agricultural sector: pineapple and cane e. Rural sector: management of domestic residues f. c. Industrial sector: caleras y galvanizadoras <p>5. To develop systematic educational programs in awareness of harmful productive practices to the environment and solid residues operation for problematic sectors in the dioxins and furans subject matter.</p> <p>6. To strengthen the capacity in emergency and natural and technological disasters related to the generation of dioxins and furans in emergency situations.</p>
Medium term 6-10 years	
	<p>7. To define indicators, by sectors, which permit to evaluate the efficiency of the implementation of the best available technologies and the best environmental practices.</p> <p>8. To create norms related to dioxins and furans releases and permitted limits.</p> <p>9. To develop the capacity to conduct analysis and control of dioxins and furans releases.</p> <p>10. To develop information generation mechanisms about dioxins and furans releases from a new requirement at the time of the functioning application that includes information about dioxins and furans releases generation and to update with this information the database of the inventory.</p> <p>11. To develop required measures to minimize negative social impacts in dioxins and furans management.</p>
6. PUBLIC AWARENESS AND PARTICIPATION	
	<p>1. To strengthen awareness, information and education of the population about persistent organic pollutants (POPs) problem</p>

National Implementation Plan for the Stockholm Convention

Action Plan	Objectives
To decrease environmental pollution and health problems derived from stocks and generation of unintended POPs.	<p>and the priorities established in the Implementation National Plan through the participation of the Ministry of Public Education, INA, Institutions of Higher Education, Professional Organization, NGOs among others.</p> <p>2. To position the National Implementation Plan subject matters for POPs reduction among key agents.</p> <p>3. To promote and support the establishment of synergies with other programs and projects (example: Peace with Nature) for the awareness and informed and organized participation of the different sectors of society related to POPs management and the National Implementation Plan.</p>

The National Implementation Plan was presented on February 2009 to the highest political level for its approval and to obtain the commitment for its implementation.

The National Implementation Plan is subject to a update process and to periodical revisions that pay attention to the dynamic nature of the Convention.

Contents

EXECUTIVE SUMMARY	IV
Table Contents	xvi
I. INTRODUCTION.....	1
1.1 Persistent organic pollutants.....	1
1.2 The Stockholm Agreement.....	2
1.3 National implementation plan in Costa Rica.....	3
1.3.1 Criteria for the definition of priorities of the PNI	4
1.3.2 Objectives of the National Implementation Plan of Costa Rica	6
1.3.3 Beneficiaries and interested parties	8
II. NATIONAL BACKGROUND	9
2.1 Demographic and physical background	9
2.2 Political and geographic structure	11
2.3 Industry and agricultural sector associated to the use and generation of the POP's	14
2.3.1 Nationwide productive activities view	14
2.3.2 Agricultural sector	16
2.3.3 Energy sector	19
2.3.4 Waste management.....	22
2.3.5 Wood combustion and other biomass fuels	24
2.3.6 Vehicles	26
2.3.7 Termination and dying of textiles and leathers	26
2.3.8 Controlled burnings and forest fires	27
2.4 Industry employment by economic sectors.....	28
III. LEGAL AND INSTITUTIONAL FRAMEWORK	31
3.1 Brief description of the main legal instruments in POP's management.....	31
b. 18346-S-MTSS-MAG decree, prohibits the usage of aldrin, dieldrin, toxaphen, chlordimeform. It was voided by the 27773 decree.....	31
3.2 Current Legislation by Usage Categories Including Several Stages from Production/Import to Final Disposal.....	34
3.3 Brief Description of Key Approaches for POPs Control.....	35
3.4 Non- regulatory Mechanisms for the Management of Chemical Substances	36
3.5 Institutional Infrastructure related to the management of POPs.....	37
3.5.1 Institutions involved in the management of POPs and their competencies.....	37

National Implementation Plan for the Stockholm Convention

3.6 Comments and analysis:	45
---	-----------

The sectors related to the usage of PCBs and pesticides have been historically controlled and in some way more aware, contrary to the productive activities that generate dioxins and furans.....45

IV DIAGNOSIS OF THE SITUATION OF PERSISTENT ORGANIC POLLUTANTS ... 46

4. 1 National inventory of PCBs	46
--	-----------

4.1.1 Situation of PCBs in the country	46
4.1.2 Methodology of the inventory	47
4.1.3 Results of the inventory	50
4.1.4 Comments	51
4.1.5 Conclusions and recommendations	54

4.2 Inventory of pesticides	56
--	-----------

4.2.1 Methodology.....	56
4.2.2 Results	57
4.2.3 Findings	61
4.2.4. Conclusions and recommendations	61

4.3 Dioxins and Furans Inventory.....	64
--	-----------

Identification of PCDD/PCDF generation places was an important stage in the application of the methodology of the *toolkit*, because it allowed planning of the data compilation. While obtaining data from some sectors it was possible to access governmental institutions or specific sectorial organizations databases that facilitate the process making unnecessary a great number of individual interviews.....64

4.3.1 Methodology.....	64
4.3.2 Results	66
4.3.3 Conclusions.....	72

9. Finally, toolkit application in the Costa Rican context does not deserve comment because important difficulties of the country and the moment were presented. To obtain necessary information, there was a high dependency on primary sources and there were not enough entities that centralize the information. Additionally, some primary sources do not provide easily the information because they do not have it available, distrust or lack of interest. This will result in a challenge for future inventory editions, but at the same time suggests management and control actions that might be convenient to undertake for the corresponding governmental entities73

4.4 Inventory of Installed Capacity in Laboratories	73
--	-----------

4.4.1 Methodology.....	74
4.4.2 Results	74
4.4.3 Comments and Conclusions.....	75
4.4.4 Recommendations	77

4.5 State of the Capacity and Legal Effectiveness in relation to the POPs	77
--	-----------

The main strengths and features to improve in relation to the capacity and legal effectiveness related to the POPs are summarized below.....77

4.5.1 Strengths:	77
4.5.2 Improvements to make:	78

4.6 State of Institutional Infrastructure Related to PCBs Management.....	79
--	-----------

Main strengths and aspects to improve related to the capacity and legal efficiency related to POPs are summarized below.79

4.6.1 Strengths	79
-----------------------	----

National Implementation Plan for the Stockholm Convention

4.6.2 Improvement to make	79
4.7 State of POPs Information Systems including essential information for decision making and of easy access.....	80
4.7.1 Strengths:	80
4.7.2 Improvements to make.....	81
4.8 State of Communication, awareness and citizenship participation.....	81
4.9 Agent perception evaluation for the impact and health and environment risk in Costa Rica, the case of cane.....	83
Related to the Stockholm Agreement that includes within its guidelines the elimination of dioxins and furans emissions and to identify the knowledge level and points of view of different agents involve in cane burning subject matter in the province of Guanacaste where cane crop is a big scale activity project " <i>Identification of key agents points of view for cane production persistent organic pollutants in the province of Guanacaste</i> " was developed.....	83
4.9.1 Methodology.....	83
4.9.2 Results	84
4.10 Socioeconomic Analysis of POPs management	87
In the evaluation, those considered direct interested are: government representatives, specifically of the MINAE, Health Ministry, sugar mills of the Grecia region, city leadership of the Grecia region, pineapple producing industries, city leadership of the Caribbean and Northern region, industries of the metallurgic sector, electricity generating industries, institutions and industries that had POPs pesticides and expired bottles.....	87
4.10.1 Methodology	87
4.10.2 Results:	88
The result of the analysis obtained is presented in the query process of the organizations agents as governmental, industries, universities, cooperatives and communal leaders through instruments as interviews as well as in the workshops performed.....	88
The analysis of direct actors bound to PCB's starts with the perception of those representatives from the different electric enterprises that participated in the institutional workshop.....	95
Government sector.....	96
Enterprises generating electricity	96
National laboratories (responsible for the analysis of the samples from generating enterprises)...	96
Social	96
Technical.....	96
Political.....	96
Economic.....	96
Government sector.....	96
Enterprises generating electricity	96
Laboratories	97
1. Investment in special equipments	97

National Implementation Plan for the Stockholm Convention

2. Investment in personnel training 97

Requirements for the actors engaged in the management and final disposal of COPs pesticides. 99

Besides, it is necessary to implement a series of conditions in order to guarantee the establishment of temporal collecting infrastructure and the management of pesticides These requirements are specified: 100

In relation to management..... 100

In relation to final disposal..... 100

V. ACTIONS PLANS..... 101

To contribute with NIP implementation to eliminate and/or reduce POPs in Costa Rica. 102

1. To establish a national policy, led by MINAET in coordination with Health Ministry, for the integral management of chemical substances and their residues in the country..... 102

2. To create legal instruments related to the management of existing POPs and generated residues. 102

3. To establish an economic instruments and incentives policy of recognition or other for the adequate management of chemical substances in general and especially POPs..... 103

To contribute with NIP implementation to eliminate and/or reduce POPs in Costa Rica. 105

2. To strengthen, within the Technical Department, intersector coordination in terms of an integral management of chemical substances with a lifecycle approach..... 105

4. Strengthen the abilities to control and follow up the safe operation of dangerous chemical substances. 106

2. To strengthen actions tending to place the matters of the National Implementation Plan for the reduction of COPs with clue social actors: ministries, academia, industries, agriculture, community associations..... 134

3. Promote and support the establishment of mechanisms inside the Secretary to strengthen synergies with other programs or projects (for example: Peace with Nature) for the SENSIBILIZAION and informed and organized participation of the different sectors of society in relation with the management of COPs and the National Implementation Plan..... 135

VI. NIP IMPLEMENTATION BUDGET..... 138

1. To establish a national policy leaded by the MINAET in coordination with the Health Ministry for the integral management of chemical products and their residues in the country. 138

2. To create legal instruments related to the management of existing POPs and generated residues. 138

1. To strengthen, within the Technical Department, intersector coordination for an integral management focused in the life cycle of chemical substances..... 138

2. To strengthen the capacities to supervise and to follow up the safe operation of dangerous chemical substances..... 138

National Implementation Plan for the Stockholm Convention

2. To strengthen actions to place the National Implementation Plan subject matters for POPs reduction among key agents: ministries, academy, industrial, farm owners, and community organizations.140

Table Contents

TABLE 1 POPULATION STRUCTURE BY AGE GROUPS.....	10
TABLE 2 POPULATION OF 12 OR MORE BY LEVEL OF SCHOOLING.....	10
TABLE 3 ADMINISTRATIVE DIVISION OF COSTA RICA.....	11
TABLE 4 REGIONAL DIRECTIONS DIVISION AND HEALTH AREAS OF THE HEALTH MINISTRY.....	12
TABLE 5 REGIONALIZATION OF THE NATIONAL TERRITORY ACCORDING TO MIDEPLAN.	14
TABLE 6 MAIN PRODUCTS IN EACH SECTOR	15
TABLE 7 PRODUCTION OF MAIN FARMING ACTIVITIES (METRIC TONS).....	16
TABLE 8 CULTIVATED AREAS OF MAIN FARMING ACTIVITIES (HECTARES)....	17
TABLE 9 MAIN ACTIVITIES OF AGRICULTURAL PRODUCTION BY REGION	18
TABLE 10 PROCESSED CANE PER YEAR ACCORDING TO GEOGRAPHIC REGIONS (METRIC TONS).....	19
TABLE 11 NUMBER OF CLIENTS, SALES IN MWH, AND INCOMES OF DISTRIBUTIONAL COMPANIES BY CONSUMPTION SECTORS	19
TABLE 12 SERVICE COVERAGE AND ENERGY CONSUMPTION IN COSTA RICA STATISTICS	21
TABLE 13 WOOD CONSUMPTION DURING 1997-2000.....	25
TABLE 14 BIOMASS CONSUMPTION IN COSTA RICA DURING 1999 (TERAJOULES).....	25
TABLE 15 ENERGY USE IN RURAL AND URBAN HOUSES DURING 2000	25
TABLE 16 VEHICLE FLEET	26
TABLE 17 TYPE DISTRIBUTION OF INSPECTED VEHICLES	26

TABLE 18 FUEL TYPE DISTRIBUTION OF INSPECTED VEHICLES	26
TABLE 19 NUMBER OF FIRES AND AFFECTED AREA BY HECTARES PER YEAR IN PROTECTED AREAS OF THE GUANACASTE CONSERVATION AREA.....	27
TABLE 20 NUMBER OF FIRES AND AFFECTED AREA BY HECTARES PER YEAR IN PROTECTED AREAS OF THE TEMPISQUE CONSERVATION AREA IN GUANACASTE DURING THE 1987-2000 PERIOD	28
TABLE 21 WORK FORCE BY ACTIVITY FIELD	28
TABLE 22 GROSS DOMESTIC PRODUCT FOR RELEVANT INDUSTRY ACTIVITIES TO POP`S AT CONSTANT PRICES 2004-2006 (PERCENTAGE COMPOSITION)....	29
TABLE 23 INDUSTRIAL EMPLOYMENT BY SECTORS	30
TABLE 24 OUTLOOK OF LEGAL INSTRUMENTS FOR THE MANAGEMENT OF POP`S BY CATEGORY	34
TABLE 25 PROHIBITED POPS IN COSTA RICA	35
TABLE 26 LIST OF PROHIBITED POPS PESTICIDES AND THE DECREES FOR THEIR PROHIBITION	35
TABLE 27 RESPONSIBILITIES OF THE MINISTRIES, AGENCIES AND OTHER GOVERNMENT INSTITUTIONS IN THE MANAGEMENT OF POPS	44
TABLE 28 TOTAL DISTRIBUTION OF THE EQUIPMENTS IN EACH PLANT.....	50
TABLE 29 SUMMARY OF THE RESULTS OF EQUIPMENT INVENTORY	50
TABLE 30 DISTRIBUTION OF EQUIPMENT ACCORDING TO INFORMATION ON THE PLATE.	51
TABLE 31 ESTIMATION OF POLLUTED EQUIPMENTS	51
TABLE 32 ESTIMATION OF GLOBAL DATA (DENERGETIZED EQUIPMENTS)	51
TABLE 33 DESCRIPTIVE SUMMARY OF THE SITUATION OF PESTICIDES IN THE PLACES VISITED.....	58
TABLE 34 RELEASE VECTORS OF THE CATEGORIES OF THE DIOXINS AND FURANS INVENTORY	66

TABLE 35 EXISTING ACTIVITIES IN COSTA RICA IN 2005 BY CATEGORY	66
TABLE 36 TECHNICAL, ECONOMIC, POLITICAL AND SOCIAL COSTS ASSOCIATED WITH THE IMPLEMENTATION OF ALL THE ACTIONS, BY SECTOR	92
TABLE 37 COSTS AS SEEN BY EVERY SECTOR AT THE MOMENT OF THE IMPLEMENTATION OF NEW METHODS FOR ENVIRONMENTAL MANAGEMENT OF DIOXINS AND FURANS.....	93
TABLE 38. REQUIRED COSTS FOR THE IMPLEMENTATION OF THE ACTIONS OF ENVIRONMENTAL MANAGEMENT OF PCB'S.....	96
TABLE 39. ANALYSIS OF COST-BENEFIT RATIO IN THE MANAGEMENT OF PESTICIDES.....	99

Figure Contents

FIGURE 1 COSTA RICAN RURAL AND URBAN PERCENTAGE POPULATION DISTRIBUTION.....	10
FIGURE 2 REGIONAL DIVISION OF THE COUNTRY	13
FIGURE 3 MAIN FARMING ACTIVITIES PARTICIPATION IN THE GROSS VALUE OF FARMING PRODUCTION FOR THE YEAR 2006. SOURCE: SEPSA, STATISTIC FARMING BULLETIN NO17	18
FIGURE 4: ELECTRIC ENERGY TYPES IN COSTA RICA.....	22
FIGURA 5: ESQUEMA PARA EL ANÁLISIS DE LA INFORMACIÓN DEL INVENTARIO DE PCB'S	49
FIGURE 6 PLACES VISITED DURING THE INVENTORY FOR COPS PESTICIDES AND OBSOLETES	57
FIGURE 7. METHODOLOGY FOR THE ELABORATION OF THE DIOXINS AND FURANS NATIONAL INVENTORY; YEAR 2005, COSTA RICA.....	65
FIGURE 8 DIOXINS AND FURANS AGENTS INTERESTS GROUP 1 IN NIP ACTIONS	89
FIGURE 9. DIOXINS AND FURANS AGENTS INTERESTS GROUP 2 IN NIP ACTIONS	90
FIGURE 10. INTERESTS OF ACTORS IN THE ACTIONS OF PIN	95
FIGURE 11. INTERESTS OF ACTORS IN THE ACTIONS STATED IN THE PNI FOR COPS PESTICIDES.....	98

National Implementation Plan for the Stockholm Convention

Acronyms

ACA-HN	Área de Conservación Arenal Huetar Norte
ACA-T	Área de Conservación Arenal Tempisque
ACLA-C	Área de Conservación Amistad Caribe
ACLA-P	Área de Conservación Amista Pacífico
ACCVC	Área de Conservación Cordillera Volcánica Central
ACG	Área de Conservación Guanacaste
ACEPESA	Asociación Centroamericana para la Economía, Salud y Medio Ambiente
ACV	Análisis de Ciclo de Vida
BCCR	Banco Central de Costa Rica
CAB	Centro agrícola básico
CCSS	Caja Costarricense del Seguro Social
CEGESTI	Fundación Centro de Gestión Tecnológica e Informática Industrial
CICR	Cámara de Industrias de Costa Rica
CNFL	Compañía Nacional de Fuerza y Luz
CNP+L	Centro de Producción Más Limpia
COPNI	Compuestos Orgánicos Persistentes No Intencionales
COPs	Compuestos Orgánicos Persistentes (Persistent Organic Pollutants, POPs)
CSP	Consumo y producción sostenible
CYMA	Programa Competitividad y Medio Ambiente
DIGECA	MINAET- Dirección de Gestión de Calidad Ambiental
DPAH	MINSALUD – Dirección de Protección al Ambiente Humano
ESPH	Empresa de Servicios Públicos de Heredia
EARTH	Escuela de Agricultura de la Región del Trópico Húmedo
EIA	Evaluación de Impacto Ambiental
EPA	Environmental Protection Agency (Agencia de Protección Ambiental)
FPN	Fundación de Parques Nacionales
EQT	Equivalentes de toxicidad
FET	Factor equivalente de toxicidad
GEF	Global Environment Fund
GIR	Gestión Integral de Residuos
GIRS	Gestión Integral de Residuos Sólidos
GTZ	Cooperación Técnica Alemana
HCB	Hexaclorobenceno
HCDD	Hexa o heptaclorodibenzo-para-dioxina
HCDF	Hexa o heptaclorodibenzofurano
ICE	Instituto Costarricense de Electricidad
IFAM	Instituto de Fomento y Asesoría Municipal
INA	Instituto Nacional de Aprendizaje
INEC	Instituto Nacional de Estadísticas y Censos
IRET	Instituto Regional de Estudios en Sustancias Tóxicas - UNA
ITCR	Instituto Tecnológico de Costa Rica
JASEC	Junta Administrativa del Servicio Eléctrico Municipal de Cartago
LANAMME	Laboratorio Nacional de Materiales y Modelos Estructurales – UCR
LIMAT	Laboratorio de Investigación de Materiales de Alta Tensión - ICE
MAG	Ministerio de Agricultura y Ganadería
MEP	Ministerio de Educación Pública
MIDEPLAN	Ministerio de Planificación Nacional y Política Económica
MINAET	Ministerio de Ambiente, Energía y Telecomunicaciones
MINSALUD	Ministerio de Salud

National Implementation Plan for the Stockholm Convention

MOPT	Ministerio de Obras Públicas y Transporte
OMS	Organización Mundial de la Salud
ONG	Organización No Gubernamental
ONU	Organización de las Naciones Unidas
OPS	Organización Panamericana de la Salud
PCB	Bifenilos Policlorados (por sus siglas en inglés)
PCDD	Dibenzoparadioxinas policlorada (de las siglas en inglés)
PCDF	Dibenzofuranos policlorado (de las siglas en inglés)
PIB	Producto Interno Bruto
PND	Plan Nacional de Desarrollo
PNI	Plan Nacional de Implementación
PNUMA	Programa de las Naciones Unidas para el Medio Ambiente
POA	Plan Operativo Anual
POI	Plan Operativo Institucional
PRESOL	Plan de Residuos Sólidos Costa Rica
RTV	Revisión Técnica Vehicular
SCCA	Sistema de control de la contaminación atmosférica
SETENA	Secretaría Técnica Nacional Ambiental
SFE	Servicio Fitosanitario del Estado
SINAC	Sistema Nacional de Áreas de Conservación
UCR	Universidad de Costa Rica
UEN	Unidad Estratégica de Negocios
UNA	Universidad Nacional
UNED	Universidad Estatal a Distancia

I. Introduction

1.1 Persistent organic pollutants

Persistent organic pollutants (POP'S) are organic compounds, usually halogenated compounds and most of the time **chloride** compounds. They are toxic, resistant to photolytic, chemical and biological decay. They have a low hydrosolubility and a high liposolubility which favors bioaccumulation in adipose tissues and for this reason is common to find them in the different parts of the food chain. This ability of bioaccumulation and the ability to remain for long periods inside living organisms can provoke a series of adverse effects in different organs and systems and increase the risk of developing pathological processes. These compounds are also semi volatile, they can run long distances in the atmosphere, transported by the air, water and migratory species across international borders before their deposition far away from the place of their release; they may be accumulated in terrestrial and aquatic ecosystems.

Though there are natural and anthropogenic forms of POP'S, those which are specially notorious for their features of persistence and bioaccumulation have been included under the denomination of "the dirty dozen". They include 9 **organochloride pesticides of the first generation: aldrin, dieldrin, DDT, endrin, chlordane, mirex, toxafene and heptachlorine with insecticide action and hexachlorobenzene with fungicide action and some other chemical products as polichlorated biphenyls (PCBs) or not intentioned secondary industrial products as the polichlorine-dibenzo-dioxines (dioxins) and the polichlorine-dibenzo-furanes (furans).**

There are some natural sources for POP'S but the most important sources of origin are the anthropogenic sources, mainly associated with the manufacture, use and elimination of certain organic chemical products. **Halogenated** compounds and specially the organochlorates have been incorporated into modern society in view of their use in chemical industry in the production of a great variety of products: from polyvinyl chloride (millions of tons per year) up to dissolvent (thousands of tons per year), pesticides (hundreds of tons per year) and different chemical and pharmaceutical specialties (amounts going from thousands of tons to kilograms).

Hexachlorobenzene, dioxins and furans are formed without intention as result of a wide range of manufacture and combustion processes. Potential sources for the generation of non intended POP'S include processes with combustion of urban and dangerous solid residues as well as the combustion of corpses and biomass, thermic processes used in metallurgic industry, manufacture of cellulose and paper because of the use of elemental chlorine or certain chemical substances containing chlorine among others..

Human exposure to COPs can be through food, work accidents and environment (including closed spaces). Acute and chronic exposure may be associated to various harmful effects on health, illness and even death.

As said, the main source of exposure to DDT for general population is food, mainly fish, cereals, rice and vegetal oil. Accidental contamination can occur by burning of electric material that uses PCBs as isolating parts.

Human population is normally exposed, in high or less degree, to the presence of dioxins and furans in the environment because of existing pollution which is higher in industrial and urban

National Implementation Plan for the Stockholm Convention

areas. Besides, there is another group that may be occasionally exposed to higher levels of dioxins and furans as result of professional exposure (occupational) or accidental exposure.

As the adverse effects of POPs upon different animal species and the risk for human beings derived from the exposure were known, the use was prohibited but not the manufacture and exportation and for this reason these substances remained for some time in the market. Nonetheless, that prohibition did not favor the elimination of these pollutants in the different environmental components (air, water, soil and biota). This fact was associated with their ability to run long distances from those countries that kept using them. This situation leads to the need to adopt common measures between developed countries and developing countries in order to stop definitely the placement of this type of substances in the different markets and most of all, in the environment. This agreement was performed by the application of common but differentiated responsibilities among producers, importers, exporters, traders, consumers and governmental authorities.

1.2 The Stockholm Agreement

The United Nations Program for the Environment propitiated the signature of the Stockholm Agreement. The awareness of the need to adopt worldwide measures in order to prevent the adverse effects caused by organic pollutants persisting in all the stages of their life cycle gave an important impulse to that signature. In the same way was the Directive 19/13C dated October 7, 1997 tending to start international activities to protect human health and the environment by the implementation of measures to reduce and/or eliminate the emissions and release of POPs. The Rio Declaration about Environment and Development and Program 21 served as the legal frame for the signature.

This agreement, signed by the parties, has the main objective to protect human health and the environment from POPs. For the purposes of this agreement: "party" is the State or a regional organization of economic integration that has consented to obey the obligations established in the present Agreement and those states in which the Agreement is in force. According to Article 7:

"Each Party will elaborate a plan for the fulfillment of the compromises derived from the Agreement and will do all the efforts to apply it; each party as well will transmit its application plan to the parties of the conference and will revise and update, accordingly, its own application plan at periodic intervals of time and in accordance to the way determined by a directive of the parties of the conference"

The Agreement points out the importance that POPs manufacturers should assume the obligation to reduce the adverse effects caused by their products and provide the adequate information about the dangerous properties of the products to users, governments and general public. Similarly, Principle 16 of the Rio Declaration about Environment and Development **reafirmado**. This Principle states that national authorities should foment the liability for environmental costs and the use of economic instruments, bearing in mind that the one causing pollution should pay the costs and public interest without burdening commerce and international investment. It is important to ideate and use alternative processes and substitutive reasonable environmental chemical products.

August 2006, Costa Rica approves the Stockholm Agreement about Persistent Organic Pollutants by means of law 8538. Three months later, in November of that same year, it is ratified by means of the decree 33438. From that moment on, Costa Rica becomes a party of

National Implementation Plan for the Stockholm Convention

the Stockholm Agreement acquiring the commitment to elaborate a National Implementation Plan (NIP). This plan should describe how the obligations established by the Stockholm Agreement will be fulfilled.

Dirección de Gestión de la Calidad Ambiental (DGECA) Ministry of Environment, Energy and Telecommunications (MINAET) Officesuscribió con el Global Environment Facility (GEF) – Agencia Implementadora, Programa de las Naciones Unidas para el Medio Ambiente (PNUMA) - Ginebra, Suiza en 2005, un acuerdo de Entendimiento para llevar a cabo el Proyecto “Actividades facilitadoras para el desarrollo del Plan Nacional de Implementación del Convenio de Estocolmo”.

1.3 National implementation plan in Costa Rica

The method used for the elaboration of the National implementation plan for Costa Rica is given by PNUMA in the “Guía para el desarrollo de un plan nacional de aplicación del Convenio de Estocolmo”, it has been divided into five stages:

- a) *Establishment of the Mechanism for the Coordination and Organization of the Process:* a Secretary for the coordination of the GESTION of chemical substances (inter-institutional team with participation of government, private sector and civil society) and PNI Project Coordinator
- b) *Establishment of inventories of Persisting Organic Compound (POCS) and evaluation of infrastructure and national capacity:* a National Inventory of Persisting Organic Compounds was done and divided into the following issues:

1. National POPs Pesticides Inventory (July 2007)
2. PCBs National Inventory (November 2007)
3. Dioxins and Furans National Inventory (January 2008)
4. Laboratories Installed Capacity Diagnosis (August 2007)
5. POPs National Profile (November 2007)
6. Design and execution of socioeconomic evaluation for the elaboration and execution of the actions plans of the Stockholm Agreement (February 2008)
7. Identification of Key Agents Points of View about POPs generation Subject Matter (March 2008)
8. Design and implementation of a POPs Information System (December 2008-January 2009)
9. Communication Strategy (May 2007, September 2007 and December 2008)

For the elaboration of these new studies, they had the participation of specialized technical groups in each subject matter leaded by a professional, who elaborated the diagnoses and strategies. In the following chapters of this document, a summary and of each study and the ones responsible of it are shown.

This process allowed the definition of the situation in relation to stocks and the management of POCs in the country, as well as the perception of key agents.

- c) *Evaluation of priorities and establishment of objectives:*

National Implementation Plan for the Stockholm Convention

For the elaboration of priorities, a first workshop was performed with members of the National Department of Chemical Substances Management where each technical group presented the results about the PCBs diagnosis, POPs pesticides, dioxins and furans, laboratories capacity for POPs analysis and they discussed them. Afterwards, The consultant presented the priority actions proposal for each of the topics based on the criteria proposed (described en section 1.3.1) and taking into consideration environmental impacts caused by the use of POPs, socioeconomic impacts and health and the alternatives for the eradication. Participants analyzed and evaluated according to an instrument designed for that purpose and they defined the priority for each action in each subject matter.

Then a second workshop took place with the participation of experts in the subject matters of analysis. In this workshop they worked on the priorities established in the previous workshop, priorities were evaluated, specific objectives were established and the desired results for each case were defined.⁹

d) *National Implementation Plan Formulation and validation* with key agents involved. Based on the priorities defined and on the objectives proposed for each subject matter, the action logical frameworks were created and they were analyzed in the workshops with key agents. Afterwards, the National Implementation Plan was implemented and validated through a workshop. For the development of the action logical frameworks, during a workshop with the key agents, they had the consultancy of Dr. Sarah French, expert for the Centre for International Development and Training (CIDT) of the University of Wolverhampton. In December 2008, a National Implementation Plan logical framework validation workshop of took place.

e) *Communication Strategy* used throughout the entire process.

As a support to the development of the process and with the purpose to place POPs subject matter, a team of professionals in the subject matter in coordination with the MINAET and NIP general coordination elaborated a massive communication strategy with videos, tear-offs and tri-fold brochure, posters, radio ads among many more that were spread through television, radio and activities of the department and in special events as the world environment day.

f) *Design and Implementation of Information System*

The design of the POPs information system has as objective to permit the generation, storage and analysis of the information related to POPs as well as, site access by links as BAT/BETs. Information is the basis that enriches proper management of chemical substances in general and in this particular case POPs and the fact that it is within interested reach of the different sectors makes it a priority interest system for the country for what a consultant team was hired¹⁰ that based on a study of the characteristics and requirements proposed designed the POPs information system and begin its implementation in January 2009

The National Implementation Plan was presented on February 2009 to the highest political level for its approval and to obtain the commitment for its implementation.

1.3.1 Criteria for the definition of priorities of the PNI

⁹ the description of the process, instruments and defined priorities, as well as the participants of the evaluation workshop are included in the Final Report of the Evaluation of Priorities for the National Implementation Plan

¹⁰ NExt Soft consultores. POPs Information System Design 2008- January 2009

National Implementation Plan for the Stockholm Convention

In order to define the priority of the actions included in the Implementation Plan the following criteria were used:

1. **Systemic approach** considering:
 - a. the risks of the POCs
 - b. the socioeconomic implications of the lack of action (and therefore suffering the consequences in human health and biota)
 - c. the different options to eliminate or reduce the delivery of POCs towards the environment
 - d. National ability to approach a problem
2. **Life cycle approach** in the application of all the instruments needed to achieve the aims of the different policies, programs and strategies related and the idea is to identify which are the points in the life cycle of the materials, economic activities and residues that may represent the best opportunities to prevent or reduce the delivery towards the environment
3. **Intersector approach** so that every governmental institution involved incorporate in their agenda, action plans and budget that corresponding actions in POPs subject matter
4. **Gradual approach** the GESTION will be gradually implemented
5. **Informed, organized and binding participation** of all sectors of society
6. **Inherent level of risk and cost**
7. **Extend of uncertainty and need of quantitative information**
8. **Synergy** between those programs tending to comply with mutually related international agreements (Rotterdam, Basle, Montreal, Climatic change, Marpol, among others)
9. **Nationwide Sustainability:** available national budget to maintain the structures to be made during the implementation

Priorities were established considering structural factors and preventive measures and control measures as well as the precision of the inventories about PCBs, POPs pesticides, non-intentional fixed and disperse sources for POPs.

1.3.1.1 Priority Areas:

Se definieron 6 áreas prioritarias:

7. Legal Strengthening
8. Institutional Strengthening
9. PCBs Management
10. Pesticides Management
11. Dioxins and Furans Management
12. Citizen awareness, communication and participation

And 2 transverse areas:

3. Analytical Capacities Strengthen
4. Development of an POPs Information System

1.3.2 Objectives of the National Implementation Plan of Costa Rica

1.3.2.1 General Objective

The main objective of the National Implementation Plan of Costa Rica is: to protect human health and the environment from Persistent Organic Pollutants in Costa Rica in the implementation of the Stockholm Agreement framework, throughout

- g. PCBs pollution control,
- h. Decrease and control of dioxins and furans releases in Costa Rica
- i. POPs pesticides elimination

1.3.2.2 Specific Objective by area

Listed below are the objectives for each area. In chapter four are detailed the complete action plans.

Action Plan	Objectives
2. LEGAL STRENGTHENING To have a proper legal framework to comply with the stipulated in the Stockholm Agreement	<ul style="list-style-type: none"> 4. To establish a national policy leaded by the MINAET in coordination with the Health Ministry for the integral management of chemical products and their residues in the country 5. To create legal instruments related to the management of existing POPs and residues generated 6. To establish a policy of instrument and economic incentives, of recognition or other for the adequate management of chemical substances in general and especially POPs
3. INSTITUTIONAL STRENGTHENING To have an appropriate and strengthen institutional framework to comply with the stipulated in the Stockholm Agreement	<ul style="list-style-type: none"> 5. To strengthen, within the Technical Department, intersector coordination for an integral management focused in the life cycle of chemical substances 6. To strengthen the capacities to supervise and to follow up the safe operation of dangerous chemical substances. 3. To establish a POPs National Information System that permits: <ul style="list-style-type: none"> - updates of the inventories by statements of the generators - access to BAT and BET information and inventories and localization of POPs stocks - generation of reports for analysis control and stocks decrease monitoring and management in general of chemical substances
7. PCBs MANAGEMENT To prevent and decrease pollution environmental	<ul style="list-style-type: none"> 8. To develop and update legislation with clear norms for the adequate management of PCBs and related residues. 9. To develop action plans and protocols for the operation and elimination of equipment with PCBs according to the norm. 10. To establish temporary stocking infrastructure.

National Implementation Plan for the Stockholm Convention

Action Plan	Objectives
problems and health problems generated by electric equipments and oils containing PCBs in the country, eliminating PCBs stocks in a safe manner and adequate and identifying polluted places.	<p>11. To train and inform.</p> <p>12. To strengthen the analytical capacity.</p> <p>6a To provide the adequate final disposal to equipment with PCBs</p> <p style="text-align: center;">Medium term 6-10 years</p> <p>6b. To provide the adequate final disposal to equipment with PCBs</p> <p>13. To identify and characterize the places polluted with PCBs.</p> <p>14. To develop criteria to select methodologies and procedures to repair the places polluted with PCBs</p>
8. POPS PESTICIDES MANAGEMENT To decrease environmental pollution and health problems derived from inappropriate management of existing POPs pesticides and obsoletes.	<p>1. To define policies and intersector plans of expired pesticides management and of packages including methodologies to prevent the generation of expired pesticides.</p> <p>2. To establish temporary stocking infrastructure</p> <p>3. To control and supervise the import of prohibited pesticides including POPs.</p> <p>4. To provide training to the emergency and natural and technological disaster attention brigades about pesticides operation in emergency situations.</p> <p>5. To develop action plans to eliminate expired pesticides promoted by the Secretary in coordination with MAG, Health Ministry and MINAET.</p> <p>6. To develop educational and informative campaigns about risk decrease in pesticide operation.</p> <p style="text-align: center;">Medium term 6-10 years</p> <p>4. To identify and characterize the places polluted with PCBs</p> <p>5. To develop criteria to select methodologies and procedures to repair the places polluted with PCBs</p> <p>6. To develop required measures to minimize negative social impacts on pesticide management.</p>
6. DIOXINS AND FURANS MANAGEMENT To decrease environmental pollution and health problems derived from unintentional generation of Dioxins and Furans.	<p>1. To develop and implement environmental management methods integrating prevention and control of pollution especially COPNI releases.</p> <p>2. To develop a database and information analysis of unintentional releases of dioxins and furans and their sources, by sector in the country, with supported information that might be incorporated in the POPs database.</p> <p>3. To develop alternate technologies to minimize POPs releases and their effects on the environment and human health.</p> <p>4. To develop pilot plans that permit research and implement, by sector or productive activity, the best available techniques that are feasible for the situation of the. Projects specifically in:</p> <ul style="list-style-type: none"> j. Agricultural sector: pineapple and cane k. Rural sector: management of domestic residues l. Industrial sector: caleras y galvanizadoras <p>12. To develop systematic educational programs in awareness of harmful productive practices to the environment and solid residues operation for problematic sectors in the dioxins and furans subject matter.</p> <p>13. To strengthen the capacity in emergency and natural and technological disasters related to the generation of dioxins and furans in emergency situations.</p> <p style="text-align: center;">Medium term 6-10 years</p>

Action Plan	Objectives
	<p>14. To define indicators, by sectors, which permit to evaluate the efficiency of the implementation of the best available technologies and the best environmental practices.</p> <p>15. To create norms related to dioxins and furans releases and permitted limits.</p> <p>16. To develop the capacity to conduct analysis and control of dioxins and furans releases.</p> <p>17. To develop information generation mechanisms about dioxins and furans releases from a new requirement at the time of the functioning application that includes information about dioxins and furans releases generation and to update with this information the database of the inventory.</p> <p>18. To develop required measures to minimize negative social impacts in dioxins and furans management.</p>
7. CITIZEN AWARENESS AND PARTICIPATION To decrease environmental pollution and health problems derived from stocks and generation of unintended POPs.	<p>1. To strengthen awareness, information and education of the population about persistent organic pollutants (POPs) problem and the priorities established in the Implementation National Plan through the participation of the Ministry of Public Education, INA, Institutions of Higher Education, Professional Organization, NGOs among others.</p> <p>2. To position the National Implementation Plan subject matters for POPs reduction among key agents.</p> <p>3. To promote and support the establishment of synergies with other programs and projects (example: Peace with Nature) for the awareness and informed and organized participation of the different sectors of society related to POPs management and the National Implementation Plan.</p>

1.3.3 Beneficiaries and interested parties

The beneficiaries of the execution of NIP are:

- a. national population because of the reduction of the risks to health by exposure to POPs which are bio accumulative in highly demanded foods. A reduction in the levels of delivery would directly benefit general health of the population and the future generations
- b. There is an indirect benefit on the health system by the reduction of expenses destined to health care and medical treatments.
- c. The different eco systems of the country by the reduction of the potential presence of POPs in water, air, soil, flora and fauna and diminish danger for the fauna
- d. Exporting sectors of society because the reduction or elimination of deliveries of POPs is showing that our compromise with environment and population is real and this will increase the trust in national products allowing the consolidation of existing markets and the opening of new ones.
- e. Tourism in indirectly beneficiated by the guarantee of visiting opportunities and inversion in places that are free from contamination.
- f. Industrial sector, especially, metallic industry by implementing BAT/BETs measures.

II. National Background

In this chapter general information about the country, regional and nationwide, is presented.

2.1 Demographic and physical background

- Country area: 51 100 km²
- Government: Constitutional democracy. Republican system with popular elections every four years. Divided in three powers: executive, legislative and judiciary.
- Official language: Spanish
- Climate: Tropical with dry and rainy season
- Total population: July 2006 estimate 4 401 849 habitants
- Urban population: 59% - 2 460 041
- Rural population: 41% - 1 709 589
- Mean age of the population 25.7 years.
- Work force population: 3 767 975 people; 90.36% de la total population
- Birth rate: 17.49 per 1000 habitants
- Life expectancy: 78.39
- Men: 76.24
- Women: 80.65
- Literacy (12 + years) 95%
- Unemployment rate 6.50%

National Implementation Plan for the Stockholm Convention

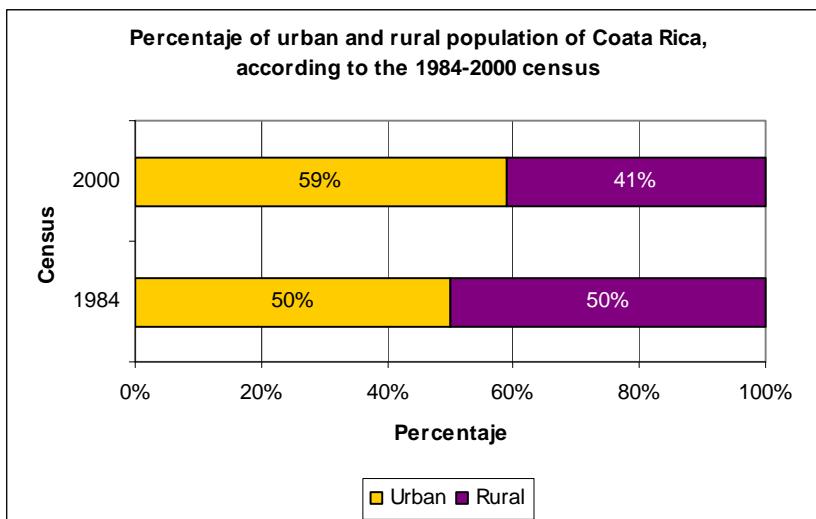


Figure 1 Costa Rican rural and urban percentage population distribution.

Source: Info Census. Central American Population, University of Costa Rica (CPC-UCR), 2004. (11-19-2007)
URL: <http://infocensos.ccp.ucr.ac.cr>

Population structure by age and level of schooling is represented in table 1 and 2 respectively.

Table 1 Population structure by age groups

Years	2002	2003	2004	2005	2006
Less than 5 years	9.6	9.4	9.2	9.0	8.8
5 to 12 years	16.5	16.0	15.7	15.3	15.0
13 to 17 years	10.6	10.5	10.3	10.1	10.0
18 to 24 years	13.3	13.4	13.6	13.6	13.6
25 to 59 years	42.3	42.7	43.2	43.8	44.3
60 years or more	7.8	7.9	8.0	8.2	8.4

Source: State of the Nation Program, Thirteenth Sustainable Human Development Report of the State of the Nation-San José, Costa Rica: State of the Nation Project, 2007. Statistical Synopsis, Social Statistics.

Table 2 Population of 12 or more by level of schooling

Year	2002	2003	2004	2005	2006
No instruction	140 773	135 897	141 425	125 127 087	127,087 127 046
Elementary school	4 027	1 960	3 566	42	222
Special education	5 646	6 377	5 642	6 456	8 603
School Incomplete	554 469	527 804	533 892	537 088	576 532
School completed	892 829	924 770	942 748	968 446	947 155
Academic high-school	912 956	977 949	1 026 001	1 075 127	1 110 044

Year	2002	2003	2004	2005	2006
Technical high-school	75 821	87 343	88 890	83 601	93 802
Superior	448 226	454 451	484 636	535 731	554 591
Ignored	26 080	27 114	23 680	16 169	18 051

Source: State of the Nation Program, Thirteenth Sustainable Human Development Report of the State of the Nation-San José, Costa Rica: State of the Nation Project, 2007. Statistical Synopsis, Social Statistics.

2.2 Political and geographic structure

Costa Rica is formed by seven provinces; each province consists of cantons, cantons divided into districts and the districts into neighborhoods or hamlets. Table 4 shows cantons and districts distribution.

Canton is where the local government is held on, which consists of a mayor and a municipal council. They are chosen democratically every four years in elections. The council is composed of legislators which represent different districts, and they are nominated by the parties involved in the elections. The council is governed by a directory elected by the legislators. The mayor, elected also by popular elections, has to report to this directory.

Among the responsibilities of municipalities are infrastructures constructions, maintenance of the roads, waste recollection, collection and administration of municipal taxes, cultural house and other programs related to women development. Some municipalities have paper, carton aluminum and plastic recycling programs. Recently, the government of the republic puts them in charge of the administration of property tax.¹¹

Table 3 Administrative division of Costa Rica

Province	Nº de Cantons	Nº de Districts
San José	20	120
Alajuela	15	109
Cartago	8	51
Heredia	10	46
Guanacaste	11	59
Puntarenas	11	57
Limón	6	28
Total	81	470

Source: National Institute of Statistics and Census (Costa Rica) www.inec.go.cr, Accessed on November 19 2007, data of the Cartography Unit and Administrative Property Division 2005

It is important to emphasize the division that the Health Ministry has, where the country is divided into regional health area, and it is by this division that the governing functions governs public health. Each of these areas has a regional direction, and are divided into different regional health areas, as shown in table 4 and figure 2.

¹¹ Information gathered from the National Profile for Rational Management of Chemical Substances

Table 4 Regional Directions Division and Health Areas of the Health Ministry.

Regional Direction	Regional Health Areas	Regional Direction	Regional Health Areas
<i>Pacífico Central</i>	Puntarenas – Chacarita Orotina, San Mateo Garabito Montes de Oro Aguirre Parrita Peninsular Barranca Esparza	<i>Huetar Norte</i>	Los Chiles Ciudad Quesada Guatuso Florencia Aguas Zarcas Santa Rosa, Pocosol
<i>Chorotega</i>	Tilarán Nandayure Hojancha Nicoya Santa Cruz Carrillo Liberia Bagaces Cañas Upala Abangares	<i>Huetar Atlántico</i>	Limón Salamanca Matina Siquirres Pococí Guácimo
<i>Central Norte</i>	Heredia San Rafael, Barva San Pablo, Santo Domingo, San Isidro Santa Bárbara Belén, Flores Sarapiquí Alajuela 1 Alajuela 2 Grecia Poás, Atenas	<i>Brunca</i>	Buenos Aires Pérez Zeledón Coto Brus Osa Corredores Golfito
<i>Central Este</i>	La Unión Los Santos Paraíso Turrialba Cartago Oreamuno Tejar		
<i>Central Sur</i>	Santa Ana Aserrí Acosta Alajuelita Puriscal, Turrubares Escazú Montes de Oca Carmen, Mercedes, Uruca Hatillo Sur, Este Metropolitano Coronado Tibás Goicoechea Desamparados Curridabat Moravia Mora, Palmichal Pavas Mata Redonda		



Figure 2 Regional division of the country

Source: National Institute of Statistics and Census, San José, Costa Rica.

The **Ministerio de Ambiente** (MINAE) also has a regional territorial unit division called Conservational Areas.

The established conservational areas are:

- Arenal Huetar Norte (ACA-HN)
- Arenal Tempisque (ACA-T)
- Amistad Caribe (ACLA-C)
- Amistad Pacífico (ACLA-P)
- Cordillera Volcánica Central (ACCVC)
- Guanacaste (ACG)
- Isla del Coco (ACMIC)
- Osa (ACOSA)
- Pacífico Central (ACOPAC)
- Tempisque (ACT)
- Tortuguero (ACTO)

On the other hand, the **Ministerio de Planificación Nacional y Política Económica (MIDEPLAN)** counts with a regional division of the territory, for the sake of investigation and socioeconomic development planning. Table 5 shows this division.

National Implementation Plan for the Stockholm Convention

The division into regions is done to put into operation the functions of the different institutions; however, they work under the guidelines of the regulating entity and the framework of obligatory obedience. In the case of POP's, the legislation and norms will be of obligatory obedience in the country.

Table 5 Regionalization of the national territory according to MIDEPLAN.

Region	Provinces
Región Central	Province of San José: Includes the cantons of San José, Escazú, Desamparados, Puriscal, Aserrí, Mora, Acosta, Moravia, Tibás, Montes de Oca, Dota, Curridabat, León Cortés, Turrubares, Tarrazú, Goicoechea, Santa Ana, Alajuelita, Coronado. Province of Alajuela: Alajuela (except the district of Sarapiquí), San Ramón (except the district of San Isidro de Peñas Blancas), Grecia, (except the district of Río Cuarto), Atenas, Naranjo, Palmares, Poás, Alfaro Ruiz, Valverde Vega. Province of Cartago: Cartago, Paraíso, La Unión, Jiménez, Turrialba, Alvarado, Oreamuno, El Guarco. Province of Heredia: Heredia, Barva, Santo Domingo, Santa Bárbara, San Rafael, San Isidro, Belén, Flores, San Pablo.
Región Chorotega	Province of Guanacaste: Liberia, Nicoya, Santa Cruz, Bagaces, Carrillo, Cañas, Abangares, Tilarán, Nandayure, La Cruz, Hojancha.
Región Pacífico Central	Province of Puntarenas: Puntarenas, Esparza, Montes de Oro, Aguirre, Parrita, Garabito. Province of Alajuela: San Mateo y Orotina.
Región Brunca	Province of San José: Canton of Pérez Zeledón. Province of Puntarenas: Buenos Aires, Osa, Golfito, Coto Brus y Corredores.
Huétar Atlántica	Province of Limón: Limón, Siquirres, Talamanca, Pococí, Matina y Guácimo.
Huétar Norte	Province of Alajuela: San Carlos, Los Chiles, Guatuso, district of Sarapiquí of the canton of Alajuela, district of Río Cuarto of the canton of Grecia, district of San Isidro of Peñas Blancas of the canton of San Ramón and the canton of Upala. Province of Heredia: canton of Sarapiquí.

2.3 Industry and agricultural sector associated to the use and generation of the POP's

In this section information about the agricultural and industry sectors is presented in this section, as well as information about activities associated to the POP's, especially those were there is a relevant reduction and elimination of POP's, and has a great impact due to high emission potential generation and POP's wastes.

2.3.1 Nationwide productive activities view

The following table show the main products made and/or processed in the country.

Gross Internal Product	2006	2007
Market prices	11,515.4	13,551.2
(thousands of colones)		
Per capita in colones	2,616.0	3,027.1
(dollars)		
Per capita in dollars	5,116.9	5,859.4

National Implementation Plan for the Stockholm Convention

	(millions of colones of 1991)		
Real GIP	1,892,473	2,031,143	
Minus: products and imports taxes (net of subsidies)	162,779	173,465	
Gross added value to basic prices	1,729,694	1,857,678	
By sector			
<i>Agriculture, forestry and fishing</i>	188,876	202,330	
<i>Mines and canteras extraction</i>	2,049	1,999	
<i>Manufacturing industry</i>	444,735	473,597	
<i>Construction</i>	74,875	91,628	
<i>Electricity and water</i>	54,059	54,719	
<i>Commerce, restaurants and hotels</i>	307,784	328,395	
<i>Transport, storage and communications</i>	261,456	282,687	
<i>Finance and insurance services</i>	88,630	99,398	
<i>Real Estate Activities</i>	82,926	86,743	
<i>Other services provided to industries</i>	72,562	83,879	
<i>Public administration services</i>	37,704	38,123	
<i>Community, social and personal services</i>	175,823	182,286	
Minus finance intermediation services indirectly measured	61,784	68,105	

Source: Economic Statistics, State of the Nation. XIV Report 2007

According to the XIV State of the Nation Report 2007:

"...the expansion corresponds to the predominant dynamism of foreign demand, especially, the one related to the performance of free trade zones and some agricultural export products like: banana, coffee, and, more recently, by the opening of markets for pineapple, melon and ornamental plants among others. Productive sectors with major industry growth in 2007, as in 2006, were: transportation, commerce and construction. Even tough, agricultural and industrial sectors registered a lower dynamism in comparison to their performance on 2006; they maintained high levels regarding last decade media (1996-2006). The particular case of high, but lower growth of the agriculture can be explained due to climate factors and by plagues that affected banana and pineapple crops.

Also, GIP expansion in 2007 had its origin in the behavior of the service sector. 4.9 out of the 7.3 production growth percentage points correspond to this sector, industry provided 1.6 points, and agriculture the remainder 0.8. The outstanding growth of construction located it as the fourth major productive sector contributing GIP.

The following table shows the main products manufactured and/or processed in the country.

Table 6 Main products in each sector

Sector	Main Products
Industry/Manufacturing	Microprocessors, food processing, textiles and confection, construction materials, fertilizers and plastic products.
Mining and extraction	Gold
Agricultural	Coffee, rice, banana, beans, sugar cane, melon, orange, African oil palm, pineapple, plantain

Source: State of the Nation Program, Tenth Sustainable Human Development Report of the State of the Nation-San José, Costa Rica: State of the Nation Project, 2007. Statistical Synopsis.

National Implementation Plan for the Stockholm Convention

Listed below is the information regarding the sectors associated to the production of POP's, with the main purpose of giving a view of the impact that some activities could have in the adequate management of POP's.

2.3.2 Agricultural sector

Table 7 Production of main farming activities (metric tons)

Product	2003	2004	2005	2006
Rice	214,792	246,984	214,345	214,345
Banana	1,901,276	1,792,501	1,608,102	1,852,954
Cocoa	708	708	708	450
Coffee	852,017	557,245	661,638	492,442
Sugar cane	3,959,185	3,804,648	3,595,000	3,992,640
Onion	26,386	33,936	32,588	53,392
Chayote	45,000	46,000	44,000	44,000
Coconut	8,000	8,000	8,000	8,000
Strawberry	3,160	1,700	1,900	1,900
Bean	15,083	10,474	10,102	10,403
Ginger	1,527	1,336	4,300	4,300
Macadamia	3,197	1,214	1,031	1,026
Corn	14,644	12,649	13,223	13,134
Mango	36,000	41,000	41,000	41,000
Melon	222,716	226,841	243,903	291,332
Orange	367,000	250,000	326,400	382,704
Yam	13,874	20,665	20,338	20,338
Ñampí	1,188	2,659	3,539	3,539
African oil palm	581,000	670,000	700,000	780,000
Palm heart	8,000	13,000	7,500	8,400
Potato	80,806	76,435	74,881	54,707
Papaya	31,125	33,815	35,565	31,090
Pepper	1,240	960	124	995
Pine cone	984,233	1,077,300	1,605,237	1 200 000
Plantain	65,717	70,015	45,180	76,635
Tobacco	92	118	109	-
Tiquisque	28,882	24,283	24,428	24,428
Tomato	47,000	45,000	41,354	42,424
Yampi	580	1,967	657	657
Yucca	85,899	77,239	73,989	73,989
Poultry farming meat	71,820.3	84,461	90,952	90,952
Poultry farming eggs	47,090.7	49,888	48,167	48,167

a/ Preliminary.

Source: SEPSA, Statistic Farming Bulletin No17

Table 8 Cultivated areas of main farming activities (hectares)

Product	2003	2004	2005	2006
Rice	54,043	62,144	53,931	48 439
Banana	41,757	42,256	41,147	42 700
Cocoa	3,550	3,550	3,000	3 050
Coffee	113,387	113,387	99 000	99 000
Sugar cane (1)	49,000	49,300	48,000	48 360
Onion	992	1,348.33	1,243	1 897
Chayote	550	570	550	550
Coconut	4,000	4,000	4,000	4 000
Strawberry	112	60	60	60
Bean	20,847	16,347	16,349	14 035
Ginger	187	110	264	264
Macadamia	2,418	1,415	1,335	1 286
Corn	8,478	6,481	6,359	6 260
Mango	8,200	8,200	8,200	8 200
Melon	10,405	10,770	11,200	-
Orange	27,000	25,000	24,000	23 000
Yam	1,001	1,541	3,595	3 595
Ñampi	351	533	662	662
African oil palm	43,200	46,600	50,125	52 625
Palm heart	8,500	8,900	8,074	7 500
Potato	3,187	3,128	3,074	2 327
Papaya	645	729	596	656
	2003	2004	2005	2006 a
Pepper	155	120	84	124
Pine cone	16,445	18,000	26,821	38 500
Plantain	10,550	10,500	6,990	11 000
Tobacco	63	65	55	63
Tiquisque	1,682	1,263	2,112	2 112
Tomato	1,175	1,000	1 000	1 100
Yampi	240	310	213	213
Yucca	7,412	7,021	15,659	15 659
Total	439,532	444,648	455,676	447 438

a: Preliminary.

(1): Refers to the cultivated area

Source: SEPSA, Statistic Farming Bulletin No17

National Implementation Plan for the Stockholm Convention

Figure 3 shows main farming activities participation in the gross value of farming production for the year 2006

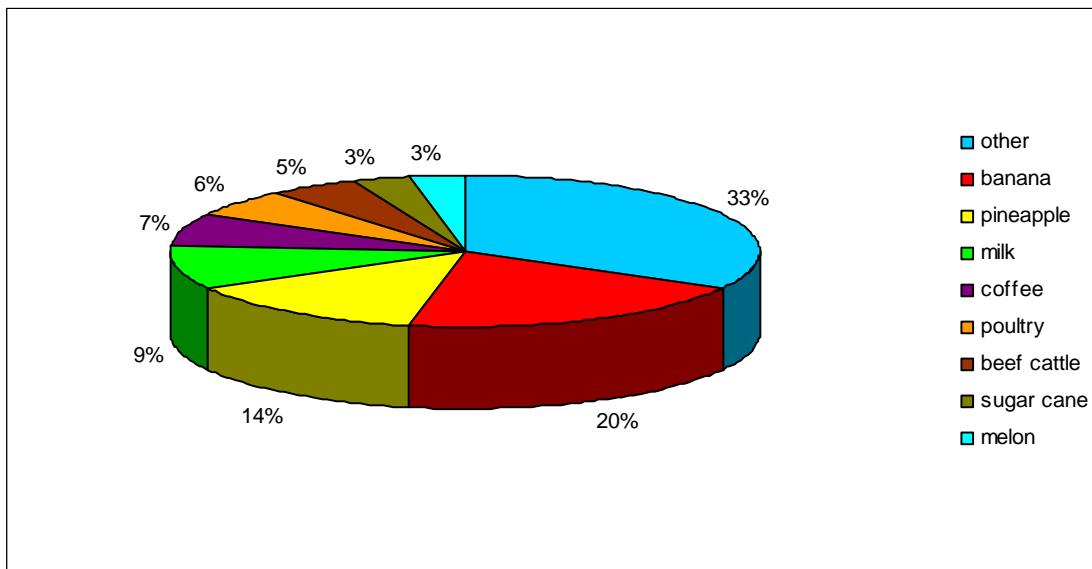


Figure 3 Main farming activities participation in the gross value of farming production for the year 2006. Source: SEPSA, Statistic Farming Bulletin No17

Table 9 Main activities of agricultural production by region

Region	Main crops
Central Oriental	Potato, onion, chayote, carrot, cabbage, cucumber, cauliflower, broccoli, tomato, hemstitch, sweet pepper, sugar beet, lettuce, granadilla, apple, avocado, macadamia, blackberry, pejibaye, coffee, sugar cane, forest.
Central Occidental	Cattle, pork, poultry, eggs, milk, avocado, broccoli, coffee, sugar cane, onion, cauliflower, sweet pepper, lettuce, mango, orange, potato, sugar beet, cabbage, tomato, carrot, strawberry, ornamentals, Indian cane.
Huetar Norte	Yucca, tiquisque, ñampí, yam, yampí, ginger, pumpkin, tania root, coconut, rice, corn, bean, pineapple, plantain, papaya, palm heart, pepper, orange, macadamia, hot pepper , cardamom, sugar cane, coffee, ornamental foliage.
Pacifico Central	Coffee, mango, watermelon, tomato, sweet pepper, bean, sugar cane, corn, rice, apiculture, oil palm, hemstitch, papaya, cashew, nance, melon, avocado, Tailand guava, tiquisque, plantain, lemon, orange, mamon, sapote, medlar, macadamia, pineapple, beef cattle and breeding, two fold milk.
Brunca	Avocado, rice, banana, cocoa, coffee, sugar cane, chayote, bean, corn, blackberry, orange, oil palm, palm heart, pineapple, plantain, tiquisque, tomato.
Huetar Atlántica	Cocoa, palm heart, plantain, yucca, tiquisque, pineapple, yam, ñampí, guava, papaya, yampí, ornamentals, organic banana, coriander (coyote), coconut, baby banana , hot pepper .
Chorotega	Sugar cane, rice, citrus fruits, bean, melon, corn, corncob, mango, coffee, avocado, papaya, lemon, watermelon, plantain, cuadrado , tomato, sweet pepper, onion, hot pepper, tiquisque, yucca, ñampí, avocado, millo , guava, aloe vera, lettuce.
Central Sur	Sweetsop, avocado, apiculture, rice, pumpkin, coffee, sugar cane, onion, pork, citrus fruits, cas, sweet pepper, bean, beef cattle, two fold cattle, hortaliza hoja , jocote, mango, corn, cashew, melon, nance, papaya, pineapple, plantain, banana, laying hen , poultry, tiquisque, watermelon, tomato, tilapia, hemstitch, pejibaye.

Source: Executive Department of Sector Farming Planning, Ministry of Agriculture and Livestock

Table 10 Processed cane per year according to geographic regions (metric tons)

Region	2003 - 2004	2004 - 2005	2005 – 2006
Total	3 959 186	3 804 650	3 615 582
Puntarenas-Guanacaste	2 490 798	2 391 553	2 157 008
South Area	290 841	299 223	298 218
Central Valley	497 736	462 303	443 406
Turrialba and Juan Viñas	248 934	245 867	263 113
San Carlos	430 877	405 704	453 838

Source: INEC statistic yearbook, 2006, with information of LAICA, DIECA, Statistic Report

2.3.3 Energy sector

The energy sector is almost 5% of the GDP; it is a very important sector for the country. Total sales of the sector are \$600 million per year.¹² Costa Rica has the lowest energy prices in Latin America. As shown in table 1.13, the percentage of national energy coverage is very high. The of non covered electrification percentage corresponds to 50 000 houses in Alajuela, Guanacaste and Puntarenas which they have not been given distributional lines because these are non efficient projects.¹³

In Costa Rica there are 8 major electricity distribution companies. Table 13 shows companies sales and sector consumption. As observed the main company is Costa Rican Electricity Institute (ICE for *Instituto Costarricense de Electricidad*).

Table 11 Number of clients, sales in mwh, and incomes of distributional companies by consumption sectors

Companies/ Year	Total	Residential	General	Minor Industrial	Large Industries	High tension large industries	Street lighting
2005							
ICE							
Number of clients ^{1/}	526 226	461 832	59 171	5 208	10	4	-
Sales in Mwh ^{2/}	2 871 730	1 096 889	750 153	442 591	209 516	298 965	73 617
Income ^{3/}	109 203 921	39 971 718	34 261 495	17 992 935	6 247 209	8 321 124	2 409 441
CNFL							
Number of clients ^{1/}	445 919	385 890	57 531	2 484	15	-	-

¹² Source: Future of electricity, *Revista Actualidad Económica*, Maganize N° 346. Year XX. December 2006.

¹³ National Energetic Strategy Final Report, Eleventh Sustainable Human Development Report of the State of the Nation.

National Implementation Plan for the Stockholm Convention

Companies/ Year	Total	Residential	General	Minor Industrial	Large Industries	High tension large industries	Street lighting
Sales in Mwh ^{2/}	3 030 275	1 277 985	979 414	445 577	259 314	-	67 986
Income ^{3/}	111 515 625	40 872 714	42 480 954	17 030 137	7 661 647	-	3 470 174
ESPH							
Number of clients ^{1/}	57 237	50 891	6 124	223	-	-	-
Sales in Mwh ^{2/}	415 996	165 871	94 141	148 551	-	-	7 434
Income ^{3/}	12 467 720	4 488 337	3 480 255	4 321 182	-	-	177 946
JASEC							
Number of clients ^{1/}	69 401	62 116	6 860	425	-	-	-
Sales in Mwh ^{2/}	430 430	214 500	76 583	128 000	-	-	11 348
Income ^{3/}	12 939 161	5 996 193	2 802 484	3 691 712	-	-	348 772
COOPEGUANACASTE							
Number of clients ^{1/}	47 365	40 796	6 248	322	-	-	-
Sales en Mwh ^{2/}	235 938	120 929	90 586	17 230	-	-	7 192
Income ^{3/}	9 125 095	4 046 588	4 003 830	808 757	-	-	265 921
COOPELESCA							
Number of clients ^{1/}	56 768	49 104	6 382	1 282	-	-	-
Sales in Mwh ^{2/}	252 250	120 004	62 611	60 303	-	-	9 331
Income ^{3/}	9 780 344	3 871 813	2 908 644	2 708 100	-	-	291 788
COOPESANTOS							
Number of clients ^{1/}	30 939	28 154	2 769	16	-	-	-
Sales in Mwh ^{2/}	102 832	52 256	12 375	34 662	-	-	3 539
Income ^{3/}	4 157 248	1 856 395	777 610	1 409 441	-	-	113 802
COOPEALFARO							
Number of clients ^{1/}	5 484	4 151	768	565	-	-	-
Sales in Mwh ^{2/}	19 224	10 380	3 145	4 982	-	-	718
Income ^{3/}	800 758	367 453	165 033	251 282	-	-	16 990
2006							
ICE							
Number of clients ^{1/}	545 893	478 291	62 244	5 343	10	4	-
Sales in Mwh ^{2/}	3 100 648	1 155 204	801 554	508 964	235 769	323 632	75 525
Income ^{3/}	133 681 809	48 334 391	41 854 893	22 934 243	7 785 677	9 673 597	3 099 008
CNFL							
Number of clients ^{1/}	455 301	393 867	59 054	2 367	14	-	-
Sales in Mwh ^{2/}	3 141 453	1 307 716	1 059 691	452 447	252 276	-	69 324
Income ^{3/}	133 677 756	48 972 986	52 668 160	19 584 696	8,533,302	-	3 918 612

National Implementation Plan for the Stockholm Convention

Companies/ Year	Total	Residential	General	Minor Industrial	Large Industries	High tension large industries	Street lighting
ESPH							
Number of clients ^{1/}	59 094	52 487	6 376	231	-	-	-
Sales in Mwh ^{2/}	451 875	174 434	100 978	168 781	-	-	7 681
Income ^{3/}	14 300 970	5 444 823	3 978 194	4 670 148	-	-	207 805
JASEC							
Number of clients ^{1/}	71 361	63 661	7 286	414	-	-	-
Sales in Mwh ^{2/}	449 903	216 109	83 189	138 945	-	-	11 660
Income ^{3/}	15 312 577	6 887 750	3 497 723	4 468 922	-	-	458 183
COOPEGUANACASTE							
Number of clients ^{1/}	50 865	43 785	6 750	330	-	-	-
Sales in Mwh ^{2/}	265 857	139 171	100 679	18 576	-	-	7 431
Income ^{3/}	11 749 786	5 432 756	4 992 072	973 926	-	-	351 032
COOPELESCA							
Number of clients ^{1/}	59 180	51 204	6 680	1 295	-	-	-
Sales in Mwh ^{2/}	275 368	127 744	72 755	65 681	-	-	9 189
Income ^{3/}	11 643 497	4 592 758	3 626 445	3 105 928	-	-	318 367
COOPESANTOS							
Number of clients ^{1/}	32 029	29 219	2 794	16	-	-	-
Sales in Mwh ^{2/}	105 727	54 019	12 752	35 183	-	-	3 772
Income ^{3/}	4 790 636	2 163 597	900 752	1 603 762	-	-	122,526
COOPEALFARO							
Number of clients ^{1/}	5 650	4 250	826	574	-	-	-
Sales in Mwh ^{2/}	19 599	10 403	3 266	5 200	-	-	730
Income ^{3/}	914 177	418 345	188 908	286 922	-	-	20 001

Table 12 Service coverage and energy consumption in Costa Rica¹⁴ Statistics

Energy consumption	2001	2002	2003	2004
	Percentage			
Population with electric service	97,1	97,1	97,1	97,1
Electric energy residential consumption per capita	651, 2	665,3	684,8	694,9
Annual electricity mean consumption per customer	kW/h			
Residential	2.74 0	2.751	2.793	2.806

¹⁴ Índice estadístico , Decimoprimer informe del Estado de la Nación

Industry	152. 319	163.86 6	176.0 02	184.1 90
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In 2004, the total amount installed for electricity generation, in the National Interconnection System, was of 1961 MW. That same year, the number of costumers was 1 203 579, and the annual mean electricity consumption was of 5 816 kilowatts-hour per costumer.

National energy generation is a reflection of the usage of resources widely available. Main sources of energy are hydroelectric, wind power, and geothermic. Hydroelectric is used the most used.

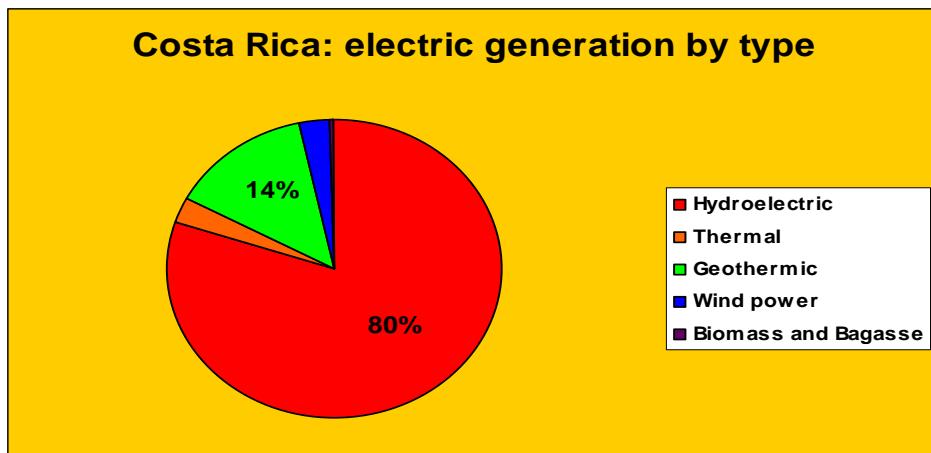


Figure 4: Electric energy types in Costa Rica

Source: Future of electricity, *Revista Actualidad Económica*, Maganize N° 346. Year XX. December 2006

2.3.4 Waste management

Article 280 of the Health General Law indicates:

"Recollection, transportation, and disposal of garbage service will be in charge of the municipalities that could perform it by administration or by contracts with industries or private that will be given according to legal formalities and that are required for their approval in the Ministry." Therefore, it is responsibility of the 81 municipalities of the country the recollection and transportation of domestic residues to their place for its adequate final disposal."

According to the diagnosis of the Solid Residues Plan¹⁵ only 7 municipalities have organizational structures having specific units in charge of the subject matters related to recollection and transportation residues services: municipalities of San José, Alajuela, Cartago, Desamparados, Curridabat, La Unión y Escazú. Approximately 85% of the municipalities provide the recollection and transportation services directly while the rest use a private service.

¹⁵ PRESOL (2007) Solid Residues Plan. Diagnosis and Priority Areas. Competitiveness and Environment Program CYMA, MIDEPLAN, MINAET, IFAM, GTZ, Chamber of Industry of Costa Rica.

Due to its population density, in urban areas there are high levels of recollection and transportation services coverage, nearly 90%. Whereas, in rural areas there is a lack of coverage of these services for it distance and low population density they are neither profitable nor effective. This situation turns these areas where there is no coverage into pollution sources due to inadequate final disposal of residues making burnings and directly pours into water beds¹⁶.

It is estimated that 4500 tons of Solid Wastes (SW) is generated per day in the country, and almost 30% is dumped without control on the streets, rivers, plots causing sewer system strangulation, visual pollution, change in the course of rivers, and environmental deterioration. (IFAM –OPS). From the very source, ordinary solid wastes mix with batteries, solvents, electric appliances parts, light bulbs among many more, increasing originally ordinary wastes dangerousness.

Solid wastes recollected by the municipalities are dumped in sanitary landfill (52%), semi controlled dumpsites (17%), and non-controlled dumpsites called “open-sky” (22%)¹⁷.

In general, in Costa Rica, domestic solid residues are recollected indiscriminately, without previous separation or selection, in plastic bags and are temporarily in metallic baskets made for that purpose or in the sidewalk or in the street before the truck takes it.

Almost half of solid wastes that are generated in Costa Rica have a high percentage of biodegradable materials (49-61%), and a high percentage of plastic and paper. However, nowadays, in the country not even 10% of recyclable materials are recovered¹⁸.

Although, there does not exist a “recycling culture” there are punctual efforts in formal and informal levels having a successful chain of initiatives and organized groups that working on the separation, separated recollection, stock, classification or even in the evaluation of residues. According to the Solid Residues Plan (PRESOL), these activities are performed in most cases by unemployed people or with no education. These activities have the support of NGOs, cooperation agencies and local governments¹⁹.

On the other hand, organic material high presence in the composition of domestic residues in the country, current experiences regarding composting of the organic part of domestic residues are in a pilot program level and there is no medium size or big size facilities for this purpose.

Final disposal of residues is a serious problem in Costa Rica. Final disposition of solid wastes varies in urban and rural areas. In the Great Metropolitan Area, alone, 58% of solid residues are produced and their main destinations are La Carpio (in la Uruca) y Los Mangos (in Alajuela) sanitary landfills are private ones, and Los Pinos (in Cartago) and Río Azul (between Desamparados, la Unión and Curridabat) that are municipal but given to a private industry for its operation. There is another sanitary landfill in Garabito, it is municipal and operated by the

¹⁶ PRESOL (2007) idem

¹⁷ Twelfth Sustainable Human Development Report of the State of the Nation. Final report. Current situation of solid wastes generation in Costa Rica.

¹⁸ Twelfth Sustainable Human Development Report of the State of the Nation. Summary of chapter 4. Environmental Friendly.

¹⁹ Solid Residues Plan (PRESOL), Competitiveness and Environment Program (CYMA) GTZ (2007) idem

municipality²⁰.

According to the multiple purposes for homes poll conducted by the National Census and Statistic Institute, it was estimated that by 1997 municipalities were in charge of the recollection of 73.8% of solid wastes, which were deposited into sanitary landfills, semi controlled and open sky dumpsites. It was also estimated that the remaining 26.2% have the following destiny²¹:

- Fire: 12.1%
- Hole: 12.0%
- Plot: 1.1%
- River: 0.4%
- Other: 0.7%

According to EVAL 2002²² in Costa Rica, 54.4% of residues are deposited in sanitary landfills; whereas, 17.5% were deposited in dumpsites and 22.4% in open sky dumpsites.

Also, it is important to mention that in the country there are at least 50 illegal dumpsites (39 final disposal sites of the municipalities and 11 clandestine)²³.

To summarize, according to PROSOL, of the 81 municipalities “34 use, for final disposal, sanitary landfills working in an acceptable manner and 47 throw their residues in controlled dumpsites or in open sky dumpsites that do not have enough technical characteristics to minimize the negative impact caused by final disposal of residues.”

2.3.5 Wood combustion and other biomass fuels

In Costa Rica, the use of biomass fuels has been a reflection of the agro-industrial historic development. During the 60s and 70s, the substitution of biomass fuels with derived petroleum products was fundamental to reach developed socioeconomic levels; however, the increase in oil fuel prices during the 80s forced, once again, the use of biomass fuels especially in agro-industrial activities.²⁴

Nationwide cogeneration using sugar cane bagasse is less than 1% of fuels used. 30% of the harvest is used in two ways: external sale to users and cogeneration of their mills. Industries use 100% of their bagasse for own cogeneration. The efficiency depends on the moisture that the bagasse has.

Beneficiado de café is one of the most productive activities that use biomass fuel specifically wood. It is followed by **beneficiado de azúcar**, food processing, lime and clay processing. Coffee plantations are the main productive source of wood in the *region central* followed by sawmills. The following tables show wood production and the consumption of biomass information.

²⁰ PRESOL(2007) idem

²¹ Solid wastes. Municipal management department, Investigation and development section. IFAM.

²² Evaluación Nacional de los Servicios de Manejo de Residuos Sólidos Municipales en Costa Rica (2003) Costa Rica. OPS/OMS

²³ PRESOL(2007) idem

²⁴ Wood for energy current status data. Arce, Hector, Ruiz Yasmin. FAO

National Implementation Plan for the Stockholm Convention

Table 13 Wood consumption during 1997-2000²⁵

	Amount (m ³)			
	1997	1998	1999	2000
Wood production	644 659.29	249 192.68	252 573.59	241 635.36
Coal loggers	40 391.89	411 67.51	41963.01	42 758.52
Total final consumption	604 267.40	208 025.18	210 610.58	198 876.84

Table 14 Biomass consumption in Costa Rica during 1999 (terajoules)²⁶

Sector	Total energy	Wood	Wastes	Charcoal	Total biomass	Total energy biomass percentage
Domestic	13 255	2 346	N.A.	147	2 493	18.8%
Industrial	21 326	160	5 157	N.A.	5 317	24.9%
Total		2 506	5 157	151	7 814	8.1%

In domestic activities, wood is also consumed to cook meals. It is significantly different the amount of wood that is consumed in rural and urban areas. The following table details this information.

Table 15 Energy use in rural and urban houses during 2000²⁷

Type of energy	Urban area	Percentage Rural area	Total country
Electricity	68	39	53
Gas	29	38	34
Kerosene	0	0	0
Coal	0	0	0
Wood	3	22	13
Other	0	0	0
None	1	1	1
Ignored	0	0	0

As detail in the above table, wood is the third type of energy use to cook in Costa Rican houses.

About wood and coal import, wood is not an important source of commerce. However, coal import represented, in 1999, a TIN value of \$1166378.00 coming mainly from Nicaragua (64%), México (25%) y USA (11%).²⁸

²⁵ Wood for energy current data status. Arce, Hector, Ruiz Yasmin. FAO

²⁶ Renewable energy guide: Biomass

²⁷ Wood for energy current data status. Arce, Hector, Ruiz Yasmin. FAO, with INEC Home Survey information.

²⁸ Wood for energy current data status. Arce, Hector, Ruiz Yasmin. FAO, with INEC import/export information.

2.3.6 Vehicles

According to information from the *Consejo de Seguridad Vial*, the vehicle fleet of Costa Rica has increased significantly.

Table 16 Vehicle fleet²⁹

Year	Vehicle fleet
2001	664 563
2002	689 763
2003	894 501
2004	952 295
2005	1 013 823

According to the information obtained from the inspections done by *RTV*, vehicle fleet distribution by vehicle type and by type of fuel they use is shown in the following tables:

Table 17 Type distribution of inspected vehicles³⁰

Type of vehicle	Percentage
Automobiles	66.01%
Motorcycles	5.94%
Other	0.48%
Works and utilities	0.11%
Trailer/semi trailer	0.06%
Agricultural	0.01%
Hazardous material transportation	0.09%
Special services transportation	2.28%
Route public transportation	2.13%
Merchandise >3500 kg	4.94%
Merchandise <3500 kg	14.72%
Taxis	3.23%

Table 18 Fuel type distribution of inspected vehicles³¹

Spark ignition (gasoline and/or LPG)	79.65%
Compression ignition (Diesel)	20.12%
LPG	0.23 %

2.3.7 Termination and dying of textiles and leathers

Textile industry in Costa Rica has reached high production and export levels. Currently, this sector has 1500 employees. Export levels have increased to \$600 billion, been 95% of these exports to US market. It is expected that if CAFTA-DR is approved, the exports will increase significantly.

²⁹ RTV 2005 Yearbook

³⁰ RTV 2005 Yearbook

³¹ RTV 2005 Yearbook

2.3.8 Controlled burnings and forest fires

During the past few years in Costa Rica, the effects of forest and controlled fires have been a concern to the authorities and people in charge of protection, conservation and development of natural resources.

Since 1997, to fight this situation the Fire Control National Strategy has been implemented. In which the general guidelines to establish institutional programs that confront in a permanent manner the problem of forest fire and fire against agricultural ecosystems are defined.³²

This strategy has allowed defining the conduct about the socialization of the problem through a legal norm that establishes the institutional faculty to order and run actions that tend to prevent and control forest fires, which are considered of public interest and of mandatory response for all authorities. Likewise, the legislation authorizes the creation of forest fire brigades and regional committees that along with civil participation and decision making have been the mechanism to integrate and respond this problem simultaneously.³³

The *Pacífico Norte*, *Pacífico Central* and *Pacífico Sur* are the areas more affected by fire. Within these areas, the most significant problem happens in protected wildlife areas especially those that are part of the Guanacaste Conservation Area. The problem in this area is not only the fire but also the affected area per year. During the past twelve years, 305 fires inside the boundaries of this area have been reported that sum up a total affected area of 40 832 hectares. This equals an annual mean of 25.40 provoked and attended fires and a total of 3405.66 hectares affected per year.

Table 19 Number of fires and affected area by hectares per year in protected areas of the Guanacaste Conservation Area³⁴

Year	Number of fires	Area (hectares)
1989	15	7 103
1990	31	5 805
1991	21	1 074
1992	25	11 836
1993	31	2 410
1994	37	2 561
1995	27	674
1996	29	2 645
1997	28	2 329
1998	33	2 621
1999	11	452
2000	17	1 322

Table 20 shows similar information for the protected areas of the Tempisque Conservation Area.

³² Fire Control National Strategy (2000-2005). National Fire Committee, SINAC, MINAE.

³³ Fire Control National Strategy (2000-2005). National Fire Committee, SINAC, MINAE.

³⁴ Fire Control National Strategy (2000-2005). National Fire Committee, SINAC, MINAE.

Table 20 Number of fires and affected area by hectares per year in protected areas of the Tempisque Conservation Area in Guanacaste during the 1987-2000 period³⁵

Year	Palo Verde	Lomas de Barbulal	Barra Honda	Bosque Diria
1987	6376	1240	0	0
1988	3227	744	573	0
1989	1167	396	413	0
1990	2855	642	459	0
1991	264	816	186	0
1992	2973	38	1075	0
1993	75	0	0	2550
1994	800	2025	540	15
1995	225	0	56	12
1996	0	0	120	50
1997	254	14	144	3
1998	11	0	136	600
1999	100	40	94	0
2000	101	221	117	0

As shown, since 1993, there has been an important reduction on the amount of affected hectares that it is justify with a greater knowledge, attention, organization, and existence of brigades; also, by the strengthen of available tools and equipment en fire fighting.

It is important to mention that burning of agricultural residues is a common practice on farmers; however, there is no systemized information about the quantity of burnt agricultural residues by production hectare, and this study calls the attention on the necessity to approach this problem.

2.4 Industry employment by economic sectors

In table 21 it is summarize the work force distribution by activity **field** for the past five years. The activities that have some relation with the use or generation of POP's are highlighted.

Table 21 Work force by activity **field**

Activity	2002	2003	2004	2005	2006
Agriculture, wildlife hunting, fishing/Agriculture and livestock	256 451	251 666	245 910	271 240	257 023
Fishing	9 283	9 068	8 540	10 569	9 466
Mines and quarries exploitation/Mines and quarries	2 305	2 486	3 903	4 232	4 747
Manufacturing Industries	241 017	244 710	245 526	259 565	257 561
Electricity, gas and water	22 430	22 567	24 359	21 136	22 830
Construction	117 836	121 861	118 668	125 337	137 601
Primary and secondary commerce/Commerce and repair	318 700	341 033	348 963	351 425	367 914
Hotels and restaurants	90 027	97 931	98 246	108 138	105 231
Transportation, storage and communication	94 000	96 683	100 002	115 931	120 837
Financial Intermediation	33 602	37 727	37 504	37 470	39 865

³⁵ National Strategy on Fire Management in Costa Rica, 2000-2005.Fie national Committee, SINAC, MINAE.

National Implementation Plan for the Stockholm Convention

Activity	2002	2003	2004	2005	2006
Real State and business activities	109 635	107 600	107 507	108 875	112 848
Public administration	74 314	79 222	80 092	83 263	88 201
Teaching	94 719	100 176	98 674	106 708	111 203
Health and social attention	54 229	50 760	53 589	65 169	65 108
Servi.comuna.soc y pers./Serví.comun. y pers.	61 067	75 025	65 771	67 568	67 491
Houses with domestic services	89 726	86 483	99 789	132 661	142 822
Organizaciones extraterritoriales	2 548	2 621	3 887	2 006	2 601
Non-specified activities	5 611	7 866	6 196	7 197	4 790

Source: State of the Nation Program, Thirteenth Sustainable Human Development Report of the State of the Nation-San José, Costa Rica: State of the Nation Project, 2007. Statistical Synopsis, Social Statistics

Table 22 Gross Domestic Product for relevant industry activities to POP's at constant prices 2004-2006 (percentage composition)³⁶

Sector	Years		
	2004	2005	2006
Agriculture, forestry and fishing	9,8	9,6	9,8
Mines and quarries extraction	0,1	0,1	0,1
Manufacturing industry	22,1	23,2	23,7
Electricity and water	2,9	2,9	2,8
Transport, storage and communication	13,2	13,7	13,9

From the above tables, it can be inferred that in Costa Rica based on the occupation of the population by activity, the sectors that have more employment and production values are the agricultural and industrial/manufacturing.

Table 23 shows information by industrial sector, terms of employment, production value, as well as main emissions, it also shows in which sectors POP's are generated.

³⁶ www.indicadoreseconomicos.bccr.fi.cr/indicadoreseconomicos

National Implementation Plan for the Stockholm Convention

Table 23 Industrial employment by sectors³⁷

ISIC code	Description	Number of establishments	Total employment	Production value in millions colones (annual)	POP's release Yes or No? Which POP's?
31	Food industry	1 390	50 464	273 166	
32	Textile/ Cloth and leather products	698	27 351	27 486	Yes, dioxins y furans
33	Wood and wood products/ imprint	689	5 972	6 220	
34	Paper and paper products	530	7 896	47 134	Yes, dioxins y furans
35	Chemical products/Coal/Gasoline/Plastic	394	19 777	133 550	
36	Non- metallic Mineral products	231	5 778	26 546	Yes, dioxins y furans
37	Basic metal industries	55	1 476	13 504	Yes, dioxins y furans
38	Equipment and machinery manufacturing	1 181	23 311	60 011	
39	Other manufacturing industries	152	2 273	4 694	Yes, dioxins y furans
	Electric generation				Yes, PCBs and dioxins y furans
Total		5 320	144 298		

Source: Own creation with information from the State of the Nation Program, Tenth Sustainable Human Development Report of the State of the Nation-San José, Statistical Synopsis, Central Bank Social Accounting Department and Environmental Protection Agency (www.epa.gov/oeca/sector)

³⁷ Adapted with information from the National Profile for Rational Management of Chemical Substances

III. Legal and Institutional Framework

This chapter intends to identify relevant POP's national and general legislation, and, also, to analyze legal and statutory weaknesses related to the management of POP's in accordance with the compliance of the Stockholm Agreement.

3.1 Brief description of the main legal instruments in POP's management

By analyzing the existent legal instrument, it can be concluded that many of them regulate in a general manner the POP's. However, there exists a very specific norm for a certain type of persistent organic compounds; the norm related to the POP's pesticides is more abundant. We now present a description of those instruments that are considered to have more relevance in the management of POP's, because they directly regulate them, or because, in their scope, are norms more general, and, in some way, include the POP's. It is important to highlight what it is mentioned in the National Profile for the Management of Chemical Substances about norms that are currently valid, even tough, in practice they are not used because they were tacitly voided by other norms with different dispositions of the same issue. Among these decrees are:

- a. 18345-S-MTSS-MAG decree, prohibits the registration, import, sale, agricultural and veterinarian, and as medication of DDT pesticide. It was voided by the 27773 decree.
- b. 18346-S-MTSS-MAG decree, prohibits the usage of aldrin, dieldrin, toxaphen, chlordimeform. It was voided by the 27773 decree.

The decrees directly related with the management of POP's are listed below

Legal Instrument	Responsible Ministry or entity	Covered Chemical Substances Use Categories	Legislation Objective
Approval of the Stockholm Agreement for management of Persistent Organic Pollutants. 8/23/2006, Law 8538		POP's management	Approve every part of the Stockholm Agreement
Ratification of the Republic of Costa Rica to the Stockholm Agreement for management of Persistent Organic Pollutants 11/6/2006, decree 33438.		POP's management	To ratify the Stockholm Agreement for management of Persistent Organic Pollutants.
Creation of the Technical Coordination Department for the Rational Management of Chemical Substances. 01/2/2006, decree 33104, RE-MAG-MINAE-S of.	RE-MAG-MINAE-S	General Chemical Substances (including POP's)	To create the Department as a support to proper national authorities in this subject matter.
Import and registration of Insecticides Regulation. July 15 th 1988, Decree 18346, published on 8/10/1988 in La Gaceta N° 151.	MS – MTSS-MAG	Pesticides, import, storage, traffic, marketing. Use and registration.	Prohibition to use Aldrin, Dieldrin, Toxaphen, Clordecone, Chlordimeform to protect animal, human health and the environment.

National Implementation Plan for the Stockholm Convention

Legal Instrument	Responsible Ministry or entity	Covered Chemical Substances Use Categories	Legislation Objective
The prohibition of manufacturing, import, traffic, sale and use of organic chlorinated insecticides. Decree N° 18451-MAG-S-TSS. 10/3/1998, Gaceta N° 187.	MS and MAG through the Plant Health General Administration.	Pesticides. Import, manufacturing, storage, traffic, marketing, use final disposition.	Protect human and animal health and the environment.
The prohibition of manufacturing, import, traffic, registration, marketing, and use of raw material or manufactured products containing polychlorinated biphenyls. December 4 th , 2001, decree No 30050-S. Published on 01/15/2002 in la Gaceta N°.	Health Ministry	Import, manufacture, traffic, registration, marketing and use.	To prohibit the manufacture, import, traffic, registration, marketing and usage of raw material or a product with PCB's.
Prohibits products containing DDT, Lindane, Eldrin and other pesticides, prohibits its agricultural, veterinary and medical use. May 19 th 1998 Decree 27773-MAG-MTSS-S. Published on 04/13/199 in la Gaceta N° 70.	MAG-MS-MTSS	Registration, formulation, import, export, traffic, deposit, storage, sale and agricultural, veterinary use and as medication.	To prohibit products containing DDT, lindane and its isomers, pentachlorophenol and micro pollutants Hexachlorodibenzo-P-Dioxin (HxCDD), endrin, chlordane, heptachlor, aldrin, dechlorane, dieldrin, toxaphen, chlordeneone, chlordimeform, dibromochloropropane, etilendibromuro , dinoseb and nitrophen as active ingredient.
Prohibition of registration, import and use of obsoletes pesticides that are not registered in the country. June 28 th 2004 Decree 31997 Published on 11/22/2004 in la Gaceta N° 70.	MAG-MS	Regulates 68 chemical substances including hexachlorobenzene	To prohibit for agricultural use the manufacture, formulation, import, distribution, traffic, registration, storage, marketing and use of raw materials or formulated products that contain hexachlorobenzene among many more.

National Implementation Plan for the Stockholm Convention

There are fundamental laws for the management of chemical products:

General Health Law. Nº 5395 of 10/30/1973. La Gaceta Nº 222 of 11/24/1973.	Health Ministry, without prejudice of health sector autonomous institutions other attributions .Art, 7.	General and public consumption chemical substances, import, production, storage, marketing, use and management, final disposal.	To govern population health.
Environment Organic Law No. 7554 of October 4 th 1995. La Gaceta No. 215 of November 13 th 1995.		Every chemical substance relate to activities that generate environmental impacts or wastes.	
Phytosanitary Protection Law Nº 7664 of April 8 th 1997, La Gaceta Nº 83 of May 2 nd 1997.	MAG, through Phytosanitary Service of the State.	Pesticides and fertilizers. Import, production, storage, marketing use, final disposal and registration.	To Project vegetables from the prejudices caused by pests.

There also exist a series of regulations related to chemical substances, among them the ones related to:

- Agricultural Aviation Activities
- Registration, usage and control of artificial formulated pesticides
- Overland transportation of dangerous products
- Features and list of dangerous industrial wastes
- Operation of dangerous residues
- Operation of dangerous products
- Atmospheric pollutants immission
- maximum pesticides limits in vegetables
- Registration of domestic use pesticides
- Functioning Permit for synthesizers, formulators, repackagers, rebottlers of agrochemicals
- Pesticides: Permitted tolerance for active ingredient concentration
- Sample taking for the analysis of pesticides residues
- To equalize pesticides and veterinary drugs registration requirements
- Agricultural consumable and animal food previously registered import
- Sanitary functioning permit of the Health Ministry
- registration and control of veterinary drugs
- Occupational Health Regulation

3.2 Current Legislation by Usage Categories Including Several Stages from Production/Import to Final Disposal.

This section is intended to provide a strategic vision of the legal instruments that control the management stages of POPs including from production, import to final disposal. In table 25, legal instruments by category of POPs and by stage are summarized.

Table 24 Outlook of legal Instruments for the management of POP's by category

Stage/POP's Class	Import	Manufacture	Storage	Transportation	Distribution/ Marketing	Use/ Operation	Disposal
POP's pesticides	X	X	X	X	X	X	
Industrial:							
PCBs	X	X		X			
Hexachlorobenzene							
Non intentional:							
Dioxins and Furans	X			X			

3.3 Brief Description of Key Approaches for POPs Control

In table 25, a list of the substances that have been prohibited or severely restricted is included.

Table 25 Prohibited POPs in Costa Rica

NAME OF THE CHEMICAL SUBSTANCE	RESTRICTION LEVEL Prohibition (P) or Severe Restriction (SR)	Details of the Restriction Reason why they are restricted
Aldrin, chlordane, DDT, dieldrin, endrin, toxaphen, heptachlor, dechlorane, hexachlorodibenzo-P-Dioxin	P	For showing persistency in the soil, they are highly toxic for water life, birds and bees. They can cause a considerable reduction of the organisms for which it is the product is not intended. Some of them show residue accumulation in human and domestic animals fat tissues, teratogenic defect, carcinogens, potential to cause human sterility and to produce mutagenic disorder, aplastic anemia, leukemia, skin irritation and central nervous system toxicity by skin absorption..
Polychlorinated Biphenyls (PCBs)	P	Because they are persistent air, water, soil and sediments pollutants and are capable of penetrating food chains where they are accumulated and their availability is biomagnified until it reaches humans.
Hexachlorobenzene	P	Because they are environmental pollutants and show human and environmental health risks.

Table 26 List of Prohibited POPs Pesticides and the Decrees for their Prohibition ³⁸

Class	Generic	Group	Decree	Condition
Insecticide	aldrin	Organochlorinated	27773 MAG-MS-MTSS (abolishes 18346 MAG-S-TSS)	Prohibited
Insecticide	chlordan	Organochlorinated	27773 MAG-MS-MTSS (abolishes 20184 MAG-S-TSS)	Prohibited
	DDT	Organochlorinated	27773 MAG-MS-MTSS (abolishes 18345 MAG-S-TSS)	Prohibited
Insecticide	toxaphen	Organochlorinated	27773 MAG-MS-MTSS (abolishes 18346 MAG-S-TSS)	Prohibited
Insecticide	dieldrin	Organochlorinated	27773 MAG-MS-MTSS (abolishes 18346 MAG-S-TSS)	Prohibited
Insecticide	endrin	Organochlorinated	27773 MAG-MS-MTSS (abolishes 19447 MAG-S-TSS)	Prohibited
Insecticide	heptachlor	Organochlorinated	27773 MAG-MS-MTSS (abolishes 20184 MAG-S-TSS)	
Insecticide	dechlorane	Organochlorinated	27773 MAG-MS-MTSS (abolishes 18346 MAG-S-TSS)	Prohibited

³⁸ National Profile for the Rational Management of Chemical Substance Document, Phytosanitary Service of the State Web Page, Pesticide Usage in Costa Rican Agro industrial Document, Pratt Lawrence, Perez J.M, de los Santos J., 1997

3.4 Non- regulatory Mechanisms for the Management of Chemical Substances

As mentioned in the National Profile for the Management of Chemical Substances document, we cannot say that there is in the country a mature policy of incentives, be it economic, of recognition or for those physical or corporate entities that properly operate chemical substances and especially POPs.

Most of these voluntary actions of non-regulatory nature include part of the management of chemical substances nationwide. There is no recollection of non-regulatory mechanisms specifically for the management of POPs.

On the other hand, it is important to highlight that there exists programs and policies of the central government for the protection of the environment and, even though, they do not mention the management of POPs in a direct way, they can function as the basis for regulatory actions in the POPs subject matter. Some of them are described below:

- National Development Plan

The National Development Plan is a strategic and counselor instrument of the Government that defines the policies that will govern the actions of the Government to promote development in the country. This plan details the objectives, policies, priorities and strategies to follow. The current executing plan 2006-2010 was planned with a strategic purpose and following a sector outline, to improve coordination different institutions that make up public sector, and to build a unitary and integrated vision of the acting of the sectors, to improve its effectiveness and efficiency and to guarantee a better assignment of public resources³⁹. The plan is organized into five bases: social policy, productive policy, environmental policy, institutional reform and foreign policy.

Within the environmental basis, among many actions, the following strategies are proposed:

Development of a promotion program of a integral environmental agenda that allows international positioning of Costa Rica as the leading country on preserving nature.

- Creation and execution of the Environmental Quality Program oriented to the establishment rules for the recovery of the quality of the environment.
- Creation and execution of the Modernization Program of MINAET.

- Peace with Nature Program

Peace with nature is an initiative of the country that summons the countries of the world to strengthen the actions and political commitment to reverse environmental degradation tendencies caused by the impact of human actions over the ecosystems of the world. For this purpose, Costa Rica offers itself to lead a commitment of the third world countries that goes beyond international agreements demands.

- Marrakech Process

Costa Rica has actively participated in the Marrakech Process, about production and sustainable consumption, in which it is intended to establish a framework of the policies to incite

³⁹ www.mideplan.go.cr, November 2007

more environmentally friendly practices in productive processes and in consumption habits of the population of the world with the purpose to reach global sustainable development goals.

- SAICM Process

Costa Rica has actively participated in the implementation of the Strategic Approach to International Chemicals Management (SAICM) adopted in the International Conference on Chemicals Management (ICCM) during its first session in Dubai, 2006. For this purpose during 2008, the Profile for Rational Management of Chemical Substances was updated and the execution of the Rational Management of Chemical Products Capacity Evaluation and the implementation of SAICM.

3.5 Institutional Infrastructure related to the management of POPs

3.5.1 Institutions involved in the management of POPs and their competencies

MINAE is the institution responsible of monitoring the compliance of the Stockholm Agreement; however, there exists also some other institutions involved in the management of POPs and the compliance of the above mentioned agreement.

Even though, there does not exist any instance, in national legislation, that has specific responsibilities regarding POPS, it corresponds to the instances involved in the management of chemical substances to assume responsibilities in the management of POPS. These responsibilities are fundamentally those regarding POPs used in the agriculture.

Regarding Polychlorinated Biphenyls (PCBs), even though their import is prohibited, there exists neither a rule nor assigned functions to any instance regarding management of POPs.

Regarding dioxins and furans, the country is short of specific regulations that limit or restrict unintentional emissions of POPs. Neither exist specific assigned functions to any institution related to dioxins and furans.

Functions of the institutions by which their functions are in charge of the management of POPs are described below:

3.5.1.1 Health Ministry

The main and general task of the Health Ministry is to guarantee that social production of health is done in an effective and efficient way, by practice of the office of the director, with full participation of social parties to contribute maintaining and improving quality of life of the population and development of the country with equity, solidarity and universality principles.

The functional profile of the office of the director of the Health Ministry clearly defines its range and chores, in its political function. Therefore, the actions of public, private, non-government institutions as well as of those people related to health in the country will be governed by the policies, sectors programs and rules established by the Health Ministry.

The health Ministry has an office in charge of the Organization of Prevention. The primary mission of this office is to promote Group Organization in Local and Regional level to attend *Technological Emergencies*. It is promoted by training, organization and coordination of necessary issues for the subject matter.

National Implementation Plan for the Stockholm Convention

Regions, by their local offices, are developing the Control of Chemical Industries and Pesticides are the ones in charge of giving functioning permits to industries and establishments that manufacture and sell products.

The most important aspects that regulate externally the performance in this field are the application of the Chemical Weapon Convention **Acuerdos RESCADD** and the Sub regional Plan on Chemical Products (Central America and Dominican Republic).

The Health Ministry has also a institutional subcommittee on Technological Emergencies in charge of coordinating the actions of the health Ministry in Technological Emergencies prevention. It is made up of representatives of the Human Environment Protection Department, Legal Counseling Department, Risk Management Office, Registration and Control Department.

They have recently created a proposition to modify the Regulation of Overland transportation of Dangerous Products, Technical Regulation for the Usage and Distribution of Liquefied Petroleum Gas.

Product Registration in the Health Ministry:

The Registration and Control Department of the Health Ministry has as main activities: to establish the rule that stipulates the specifications by which products that can directly affect human health can be commercialized. To control the compliance of this rule the department keeps a updated file of the products and performs appropriate market and industry controls.

Its labor intends to guarantee that the products, materials and equipments that directly or indirectly affect population health as well as the establishments related comply with the rules and current technical, legal and administrative regulations intending to guide social entities behavior and to improve health levels.

Products that are registered in this department are:

Food, drugs, cosmetics, stupefacent drugs, psychotropic, precursors, dangerous chemical products, natural products, biomedical products and material.

Regarding chemical products, the Health Ministry has a Pesticida File and a Chemical Products File.

3.5.1.2 *Ministerio de Ambiente, Energía y Telecomunicaciones*

The **Ministerio de Ambiente, Energía y Telecomunicaciones** is relatively new, it was created in 1995 under the Environmental Organic Law, and, even though, it has previously existed with other names like **Ministerio de Recursos Naturales, Energía y Minas** (On June 21st 1990 Law 7152, changes the **Ministerio de Industria, Energía y Minas** into the **Ministerio de Recursos Naturales, Energía y Minas**, to which General Directorate of Forest, Wildlife Department, General Directorate and Service of National Parks are added, also it will have attached the National Meteorological Institute). The integral vision on the environmental subject matter started during the 90s with the executing peak of the international environmental rule. On August 13th 2008, telecommunications are included as work field and are part of carrying out the international environmental rule and then it becomes the **Ministerio de Ambiente Energía y Telecomunicaciones MINAET**

National Implementation Plan for the Stockholm Convention

The **Ministerio de Ambiente y Energía** is established as the proper and responsible authority of coordinating derived actions from the application of the Stockholm Agreement.

a. Management on Environmental Quality Department of the MINAE (DGECA)

It was created under the executive decree NO. 31628-MINAE on October 9th 2003. It has a general objective "Improving the quality of water, air and soil resources by the implementation of environmental quality tools address to different sectors of society, contributing, in this way, on reaching sustainable development in the country".

Also, its institutional objectives have been defined as follow:

- To provide conceptual contributions, technical and legal for the definition of strategies and public policies in environment quality subject matter with the purpose of improving the environmental performance of different social entities (institutions, industries, citizenship, etc) to guarantee a healthy environment.
- To design and implement monitor mechanisms and control strategies and environmental quality policies that different instances of the sector execute.
- To create compromise units and interinstitutional instances to promote governability processes in the environmental quality subject matter.
- To provide information on the environmental performance of the country by proper means to citizenship, with the intention to comply with the commitment of the 10th Principle of the Rio Declaration.

Even though its existence is short, it has characterized for promoting innovative norms, for incorporating new principles of environmental right and economic instruments. Among the most important can be mentioned: Cleaner Production Policy, Regulation for the Creation of a Management System of Electric Residues (in progress), Regulation of Evaluation and Classification of Superficial Water Bodies, Environmental Emergencies Attention Protocol, Quality of Air Plan and the Environmental Recognition System, among many more.

b. Technical Coordination Department for the Rational Management of Chemical Substances, The Technical Coordination Department for the Rational Management of Chemical Substances was created under this decree under the decree 33104 on January 2nd 2006, it will act as a support organism for proper national authorities and main argument of different conventions related to this issue, as to other associated authorities, for the purpose of promoting an effective and efficient conduction of chemical substances subject nationwide It is also established that the technical department is integrated by the following members:

- a. Two representatives of the Ministry of Agriculture and Livestock.
- b. Two representatives of the Health Ministry.
- c. Two representatives of the **Ministerio de Ambiente y Energía**.
- d. One representative of the Ministry of Foreign Affairs and Worship
- e. Two representatives of Customs Services of the Treasury Department.
- f. One representative of the Occupational Health Board
- g. Two representatives of Non-governmental organizations (NGO) associated to the chemical substances issue.

- h. Two representatives of **la Unión Costarricense de Cámaras y Asociaciones de la Empresa Privada** associated to the chemical substances issue.
- i. Two representatives of the Board of Chancellors associated to the chemical substances issue.

The established roles for the department are to monitor and support:

- a. Actions designed to look up for validation, implementation and follow up of related agreements to the subject matter of chemical substances management.
- b. Policies, strategies, programs and actions for the management of chemicals substances in the country.
- c. Actions and measures that are established are carried out in a coordinated and integrated manner in different sectors of society.
- d. Actions with national authorities and focal points of different agreements and other international entities in subject matter of chemical substances as appropriate.
- e. National authorities, create reports of different conventions and to negotiate professional technical support for their preparation.
- f. National authorities in the application and follow up of resolutions and recommendations adopted by conference of parties in chemical substances subject matter.
- g. National authorities spreading information generated in different conventions and conference of the parties.
- h. With other actions that national authorities consider necessary in their competent scope.
- i. Organization of workshops, symposiums, conferences, lectures and courses promoted by national authorities, regional centers, executive secretaries of respective agreements.
- j. In the study and emission of criteria non-binding related to notifications in those cases that for technical complexity, or their potential risk to health and the environment are submitted to consideration by proper national authority or focal points when corresponds.
- k. With technical and legal recommendations related to law projects and technical regulation for chemical substances.

I. With actions plans related to the subject matter created by competent ministries.

3.5.1.3 Ministry of Agriculture and Livestock

After the restructuring inside the Ministry of Agriculture and Livestock, three Basic divisions were generated: Agricultural (Research, Experimental Stations and Agricultural Protection), Agricultural Extension (Regional Departments) and Administrative. The strategic basis to provide technical assistance was based on the attention to Basic Agricultural Centers (BAC) that intended the concentration of actions and responsibilities as a response to the agricultural problem.

Phytosanitary Service of the State

The Phytosanitary Service of the State is a department of the Ministry of Agriculture and Livestock and its mission is to protect plants and crops that made up the national agricultural patrimony from pests of economic important and quarantine, it monitors that the marketing of agrochemicals with the support of current technical and legal regulations looking for the protection of human health, biodiversity and to comply with phytosanitary regulations that rule national and international marketing of vegetables with the purpose to contributing with the Public Sector and Private Sector effort of increasing and diversifying exports and of satisfying national demand. It is located in the facilities of Barreal de Heredia.

To execute planned actions the Phytosanitary Service of the State acting pursuant to the following technical managements: a) Agricultural Supplies, b) Monitor and Control of Pests, c) Biotechnology, d) Accreditation and Registration of Organic Agriculture, e) Laboratories, f) Export, g) Vegetable Quarantine. They also have the Executive Subdirección and the Administrative and Finance Management. The technical managements with the support of Law NC 7664 on May 2nd 1997 and its executive decree NC 30111-MAG Publisher in La Gaceta N° 18 on January 25th 2002 has as functions:

3.5.1.4 Occupational Health Council of the Ministry of Labor and Social Security (MTSS):

The OCCUPATIONAL HEALTH COUNCIL is the specialized instance of the MTSS in occupational health subject matter refers to. It has a board of directors made up of tripartite characteristic, with a representation of employers, employees and the Government. Likewise it has an Executive Director that at the same time works as the Secretary of the Board of Directors. The members of this board are: a representative of the Ministry of Labor and Social Security (that presides), a representative of the Health Ministry, a representative of the National Insurance Institute, a representative of the **Caja Costarricense del Seguro Social**, two representatives of the **cámaras patronales**, two representatives of unions organizations.

The Occupational Health Council was created in 1982 and is based in the Labor Risk Law N°6727 that amends the Title Four of the Labor Code in especial protection to the employees while working, and it makes of public interest everything regarding occupational health and creates a governing body in charge of the policies of the subject matter, Occupational Health Council. Also, it has a Technical Department made up of 12 officers, among them, those of Labor Medicine, Security and Hygiene Department.

The functions of the Occupational Health Council are:

- Promotion of Hygiene and Security specifications at the job.
- Research, Employers and Employees Training
- Creation of labor risks prevention.
- Disclosure and permanent information.
- Bill projects and regulation on the subject matter writing.
- Promotion of creation of Occupational Health Committees.
- Promotion of the creation of Occupational Health Departments and Offices.
- Interinstitutional and intersectorial coordination
- Incorporation of the occupational health subject matter in the educational formal system jointly with the Ministry of Public Education

Their services are:

- Technical counseling to different institutions.
- The execution of specific projects jointly with sector of national production.
- Committees, departments and occupational health offices counseling.
- **Take care of reports** ante non compliance of the legal norm in the occupational health subject matter.
- Registration of the committees and offices or departments of occupational health.
- **Reception** and granting of functioning permit of calderas.
- **Conflict mediation** of occupational health subject matter.
- Training

- **Inspection** on labor security and hygiene.

3.5.1.5 Treasury Department

The Treasury Department is the organ that in the administrative structure of the Republic of Costa Rica is basically in charge of establishing and executing **Hacendaria** policy.

National Customs Service: Competencies and functions

Article 4—It is the superior organ in the customs subject matter. The General Directorate of Customs is the superior hierarchical national organ in the customs subject matter with functions established by the CAUCA, RECAUCA, law and other fiscal, regulatory and of general rules. The General Directorate will have a General Manager and a vice- General Manager, and will be assist by professionals and necessary assistance for the compliance of their duties. It can have the amount of consultants they consider appropriate.

Section I

General Directorate

Article 6—Competence of the General Directorate. It is competence of the General Directorate to determine and issue policies and guidelines that focus decisions and actions on the effective compliance of the goals of the legal customs regime and the achievement of the objectives of the Custom National Service.

It is obligation of the General Directorate, of the General Manager, the definition of equipment or functioning labor areas of the group structure of those agencies of the Customs National Service that do not have a minimum structure defined in this Regulation.

The General Directorate is made up of areas that will help in the execution of its functions:

- a. Area of Strategic Planning and Management Control.
- b. Area of Foreign Affairs and Relationships.

COMPETENCE OF THE CUSTOMS LABORATORY AND SPECIAL STUDIES DEPARTMENT

This department is in charge of performing physical, chemical, technical and mercenológicos studies of imported or exported merchandise by foreign commerce operadores de comercio exterior, los ingresos y salidas de materias primas y productos, mermas y desperdicios de las mercancías ingresadas a los regímenes especiales, así como a solicitud de las diferentes dependencias del Servicio Nacional de Aduanas y otras instancias que así lo requieran.

It is also in charge of performing especial studies that aporten elementos probatorios para la correcta determinación de la clasificación e información que sirva de apoyo para estudios de verificación de origen de las mercancías.

The department estará a cargo of a boss.

Article 30 bis.—Functions of the Customs Laboratory and Special Studies Department. The department will perform the following functions:

- a. To provide technical assistance in its competence subject matter to the different agencies of the Customs National Service and other instances requiring it.
- b. To perform analytical tests by physical and chemical studies that determines qualitative o quantitative characteristics of the merchandise for its proper tariff and origin classification.
- c. To determine tariff classification according to the results obtained from the analyses performed supporting supervision processes.

National Implementation Plan for the Stockholm Convention

- d. To determine technical criteria and preventive measures to conduct the extraction of representative simples that are object of the analysis as well as its transportation, storage, return, destruction and others.
- e. To run and execute research and special studies designed to aim and establish new chemical and physical analysis methods of the merchandise that allows determining proper tariff classification or origin determination.
- f. To interpret chemical analysis issued and to indicate proper tariff classification.
- g. To monitor the creation and update of scientific data base of the merchandise related to its physical, chemical and merceological features.
- h. To collaborate with the training of customs officers and by request of other instances in areas of the competence of the Custom Laboratory.
- i. To coordinate with the agencies in charge of the import and export permits of chemicals substances controlled by international agreements for the physical control of these when consider appropriate or by request.
- j. To execute jointly with other authorities simple taking in all national customs territory for its analysis when it corresponds.
- k. Other assigned by the Supervision Manager.

TICA:

It is a component of the National Treasury Service Strategic Plan trying to modernize customs management by intensive use of technology. The implementation of TICA will allow integrating all customs of the country and at the same time interlace them with the commercial and industrial sector and with all public offices involved in the import and export of merchandise and vehicles of the country.

The following tables summarizes the responsibilities related to the management of POPs in Costa Rica

Table 27 Responsibilities of the Ministries, Agencies and other Government Institutions in the management of POPs

Chemical Substance	Life cycle Stage/Ministry in charge.	Import	Manufacture	Storage	Transportation	Distribution/Marketing.	Use/Operation	Disposal
POPs pesticides	Ambiente y Energía							X
	Health	X	X	X	X	X	X	X
	Agriculture and Livestock	X	X	X	X	X	X	
	Labor and Social Security						X	
	Economy, Industry and Commerce		X			X		
	Public Works and Transportation				X			
	Treasury ²	X						
PCBs	Ambiente y Energía							
	Health	X	X		X		X	
	Agriculture and Livestock							
	Labor and Social Security							
	Economy, Industry and Commerce							
	Public Works and Transportation							
	Treasury ²							
Dioxins and furans ¹	Ambiente y Energía							
	Health							
	Agriculture and Livestock							
	Labor and Social Security							
	Economy, Industry and Commerce							
	Public Works and Transportation							
	Treasury ²							

1. The regulations do not refer to the management of dioxins and furans in any stage of the life cycle, nor as source of unintended generation, with the exception of decree 27773 in which dioxins as ingredient of agricultural and veterinary products are prohibited.

2. Ministries have to request the Technical Notes to the National Customs Service of the Treasury Department to decide whether to give or not proper permit (if there exists a Technical Note)

3.6 Comments and analysis:

It is clear there exist a environmental regulation in the country that frames the management of chemical substances in general and in part the management of POPs. There also exist international commitments and national planning initiatives that include issues related to the protection of the environment, all of this within a commitment framework with environmental protection in a integrated manner. Some of these non regulatory instruments are so global they include indirectly the regulation of POPs. This is of special importance to justify the actions that must be proponer in the National Action Plan on POPs. However, it is necessary to establish a nationwide policy that includes integral management of chemical substances products and residues includes in the POPs.

Regarding the regulation section of the POPs compounds, the pesticides are the ones that are more regulated. In the case of the PCBs and dioxins and furans, there also exists a regulation addressed to the prohibition of importing and usage in the country as with the pesticides. However, the regulatory guidelines for the operation and final disposal of the POPs substances do not exist, and neither exist a norm regarding occupational health related to the operation of PCBs and dioxins and furans. Totally different that in the case of the pesticides for which there exists a recently created regulation.

In the specific case of the PCB, it is necessary to establish a norm that firstly defines the acceptable level of PCBs in polluted products, because, even though, the actual value is of 50ppm a most strict regulation can be established. Secondly, this regulation must provide the guidelines to perform an adequate management of PCBs that exist in the country, including aspects on occupational health, operation, registration of information, storage and adequate final disposal.

In a general manner and especially for the PCBs and dioxins and furans, the compliance of the norm is affected by the lack of follow-up and their control, besides the lack of analytical control from the state that permits to monitor of generated emissions. This will be further discussed in chapter 9 Technical Infrastructure.

The sectors related to the usage of PCBs and pesticides have been historically controlled and in some way more aware, contrary to the productive activities that generate dioxins and furans.

IV Diagnosis of the Situation of Persistent Organic Pollutants

4. 1 National inventory of PCBs⁴⁰

4.1.1 Situation of PCBs in the country

There is no certain historical information about the use of PCBs in the country. If we take into consideration the main uses given to these substances in the rest of the countries it can be expected that the situation in Costa Rica is quite similar. The main known use in Costa Rica has been as dielectric fluid in equipments of distribution of electricity. Nevertheless and spite of the prohibition for the importation and use of PCBs or materials containing PCBs it is likely that there are still residues of materials and products containing or having contained PCBs.

Based on the most certain information all the efforts for the inventory were addressed to those equipments for electric transmission (transformers, **capacitors**, oil cans from electric equipments among others).

In Costa Rica the generation and distribution of energy is done through the *Sistema Nacional Interconectado* which is composed by three big sectors:

- Companies generating private and public electricity
- Instituto Costarricense de Electricidad which is the entity responsible for the construction, maintenance and operation of transmission infrastructure and the delivery of energy
- Distributing companies which are the ones finally selling energy to consumers.

At this moment the group of final distributors of the energy is formed:

- 4 cooperatives: Coopelesca, CoopeGuanacaste, CoopeSantos and Coope Alfaro Ruiz. These 4 gather 7% of national sale of electricity.
- 2 companies in the provincial level: Empresa de Servicios Públicos de Heredia (ESPH) and Junta Administradora de los Servicios Eléctricos de Cartago (JASEC). They gather 11% of the sales of energy.
- 2 national companies property of the State: Instituto Costarricense de Electricidad (ICE) and Compañía Nacional de Fuerza y Luz (CNFL). These are the most important as the ICE provides 39% of the national market and CNFL covers 43% of the national demand, especially in the metropolitan area. In total, these 2 companies cover 82% of the national market.

As it may be observed, ICE is the main electric company in the country, not only because of it is in charge on electric transmission for the whole country but it is also in charge of the final distribution of the energy.

⁴⁰ Alfaro, C. (2007). Informe Final. Inventario de Bifenilos Policlorados. PC B's. DIGECA. MINAE

4.1.2 Methodology of the inventory

The main objective of this inventory was to estimate the amount of PCBs existing in the country in order to determine the immediate measures for the handling and the working priorities in the future for the correct final disposal of these substances. Annex 1 shows the complete National Inventory of PCBs.

It is important to mentioned that previously to this inventory, in 2004, another inventory was made with the participation of Instituto costarricense de Electricidad (ICE) y de la Compañía Nacional de Fuerza y Luz (CNFL), with the support of a donation of the Netherlands government. This is stage one. Also, in 2005, an inventory in which cooperative, la Empresa de Servicios Públicos de Heredia (ESPH) y la Junta Administrativa de Servicios Eléctricos de Cartago (JASEC), with Money from the Basle Agreement was made. This is stage two. This current study includes the two previous inventories and it expands then with the information generated by the ICE as a result of kits implementation and laboratory analyses that makes up stage three.

For the purposes of the inventory contaminated equipment is that equipment having PCBs in concentrations higher than 50ppm.

a. Field collection of data

The process of the inventory started with the training of workers from the companies distributing electricity. The training included information related with safety aspects about PCBs and the methodology and information to be collected to do the census of the equipments. Annex 1 show the format used to gather the information.

The equipments inventoried were those not in uses, whether because of maintenance operations or because they were permanently out of use as result of damages or equipments waiting to be repaired, at the moment of the inventory and stored in the fields of the distributing companies. The gathering of the information was the responsibility of the own personnel of each of the companies. All equipment that has been put into the inventory received a code that was painted in the external chassis in order to avoid that it could be replaced again in the lines of distribution or that it could be taken to another place to receive maintenance.

b. selection of equipments for the analysis

Analyses as part of the inventory were performed in three different stages:

i. Initially the procedure started with 100 kits for the determination of PCBs, clor-n-oil 50. At the moment of the application of the kits the only information available was that from the ICE and CNFL plants so the analysis were distributed among the places complying with any of the following criteria:

- equipments with evidence of having been opened (there is no certainty that the oil contained complies with the characteristics shown in the Table).
- equipments with no evidence of having been opened, with date of manufacture smaller than 1986, no saying the type of oil or showing that the oil is not mineral, oil without PCBs or having less than 50ppm of PCBs.

Once the data were filtered it was possible to determine which equipments had to undergo sampling and 100 were chosen at random to be analyzed with the kits. These equipments were distributed between all the plants of the ICE and CNFL. The percentage of sampled equipments is proportional to the contribution of each plant to the total amount of filtered

National Implementation Plan for the Stockholm Convention

equipments. In order to verify the results of the kit, those tests giving positive were also analyzed by chromatography.

ii. The second group of analysis was performed as part of the activities derived from the Basle Agreement. For this analysis 200 analysis kits were available and were applied to 4 companies in charge of electric distribution which were not included in the first group. The selection criteria were the same as for the first group but in this case results were not verified by chromatography.

iii. the third group of analysis was done by the ICE through UEN Costumer Service Electricity. The amount of equipments chosen for the analysis was 6100 and corresponds to waste equipment that will not be replaced into the network and requiring an urgent and adequate final disposal, most of these equipments were found inside the Miravalles Plant, ICE. At the moment of the development of this document 2026 equipments have been inventoried and 1851 samples have been analyzed with the kit. At this moment as well, the analysis for those 2026 equipments were almost finished and were are expecting the purchase of another 2000 kits. As part of the analysis procedure, the positive samples underwent the process of moisture elimination by centrifugation and were analyzed again with the kit test to verify the result. The highest part of the tests that continued giving positive results were sent to chromatographic analysis in order to verify the result of the kit and to quantify the exact content of PCBs.

c. Procedure for the analysis of the information

With the intention to make a first approximation about the amount of equipments containing oils with PCBs greater than 50ppm the classification detailed in Figure 5 was used.

According to this scheme it was possible to determine the suspicious group. Afterwards and following the analysis results obtained with the kits and the chromatography it was possible to an approximation of the amount of equipments with PCBs.

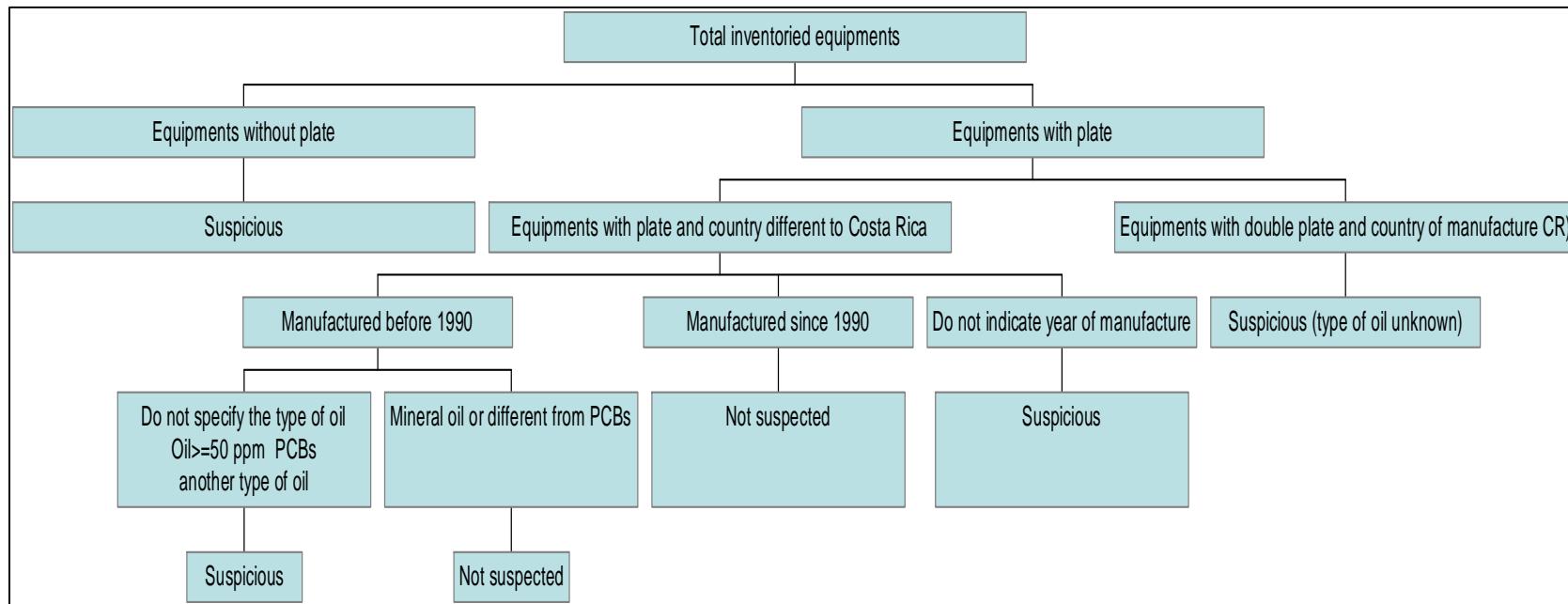


Figura 5: Esquema para el análisis de la información del Inventario de PCB's⁴¹

⁴¹ En Costa Rica no se fabrican equipos eléctricos de ese tipo, sin embargo si existen algunas empresas que en algún momento se dedicaron a dar servicio de mantenimiento de transformadores y otros equipos. En estos casos se colocaba un placa que indicaba el nombre de la empresa y como país fabricante Costa Rica. Es por esta razón que los equipos que tienen doble placa o que indican como país Costa Rica, se consideran sospechosos pues no se sabe con certeza que manipulación se dio al aceite y al equipo.

4.1.3 Results of the inventory

Table 28 shows the detail of electric equipments inventoried per plant. This information is about the total amount of equipments and not only about those containing PCBs.

Table 28 Total distribution of the equipments in each plant.

PLANT	JASEC	ESPH	Coopelesca	Coope Guanacaste	Eléctrica Matamoros	ICE y CNFL	Total
Total	1982	582	516	469	16	11 174	14 739
% of the total	13.4	3.9	3.5	3.2	0.1	75.8	100

The features of the equipments according to the information inventoried are shown in Table 29.

Table 29 Summary of the results of equipment inventory

Information		amount	Percentage%
Type of equipment	Electric equipment	14401	98
	Barrel	81	1
	N.S	257	2
Year of manufacture	before 1970	83	1
	1970-1979	447	3
	1980-1989	1661	11
	1990-1999	2229	15
	2000 and onwards	3758	25
	N.S	6561	45
Type of oil	No PCB	1849	13
	Mineral	2589	18
	50 ppm PCB	291	2
	Less than 50 ppm PCB	164	1
	More than 50 ppm PCB	2	0
	Others	1624	11
	N.S	8220	56
Information		amount	Percentage%
Country of manufacture	USA	9361	64
	Venezuela	443	3
	Costa Rica	1216	8
	N.S	2844	19
	Others	875	6
Manufacturer	ABB	1514	10
	General Electric	1683	11
	Howard	3492	24
	Westinghouse	2036	14
	Others	5299	36
	N.S	715	5
Equipment with/without leak	With leaks	2155	15
	With no leaks	12192	83
	N.S	392	3

Note: N.S. not specified

The distribution of equipment with and without plate is shown in Table 30.

Table 30 Distribution of equipment according to information on the plate.

Equipment with /without plate	With plate	14113	96
	Without plate	470	3
	N.E	156	1

Table 31 presents estimations about the amount of polluted equipments according to results presented in previous Tables.

Table 31 Estimation of polluted equipments

	Percentage	amount
Total equipments	100%	14 739
Positive with the kit⁴² (range)	10%	1 474
	15%	2 211
Positive by chromatography (range)⁴³	0,10%	15
	1%	147

Table 32 Estimation of global data (denergized equipments)

Information	Amount
Inventoried transformers	14 739
Analyzed transformers	2 148
Polluted analyzed transformers (according to analysis with kit)	246
Polluted analyzed transformers (according chromatographic análisis)	3
Estimation of the amount of equipments (based on the results of chromatographic test):	22
Estimation of the amount of equipments (based on results with the kit test):	1 499
	Tons

4.1.4 Comments

The inventory process was firstly addressed to make a collection of information for the total of equipments found in plants and warehouses, whether temporarily or permanently waiting for final disposal. The information gathered allowed to have a general idea of the oils contained in the equipments; nevertheless, in 56% of the cases this was not possible because the equipment did not have the plate or because the type of oil was not described in the plate or because the information was illegible (plate was blurred or in bad condition). Besides, in some cases the relation between the information on the plate and the oil contained in the equipment is not clear). For this reason it is necessary to review the first approximation made from the

⁴² Percentage from Tables 4, 5 and 6, with positive values for the tests with kit, 10%, 11% and 15%

⁴³ Percentage from Tables 4 and 9, with positive values for chromatographic test from 0.1% to 1%

information of the plate (Table 1 and figure1). The lack of information in this case could overestimate the amount of PCBs.

the largest amount of inventoried equipments belong to the ICE and inside the ICE, the plant with the largest amount of stored equipment is Miravalles. Traditionally, this station, along with the one in Colima have been the places for the storage of old or damaged equipment and need a prompt and adequate final disposal.

Considerando que los equipos con PCBs que están en buen estado y en funcionamiento no son una amenaza directa a la salud y el medio ambiente, los esfuerzos del inventario se dirigieron especialmente a aquellos equipos que si presentan un problema ambiental inmediato, siendo este el grupo los que están almacenados en los diferentes planteles a nivel nacional y que deben ser sometidos a un proceso de disposición final adecuada en la mayor brevedad posible.

Considering that the equipments with PCBs that are in good condition and in use are not a hazard for human health or the environment, the efforts of the inventory were directed towards those equipments representing an immediate environmental threat. This group is composed by equipment stored in different plants around the country and must be processed for a final adequate disposal as soon as possible.

The UEN Electricity Costumer Service of the ICE did a wide work trying to localize those waste equipments that would not be used anymore and thus requiring a prompt final disposal. They identified 6100 equipments. The difference with the total of equipments found in the plants corresponds that could eventually be reused. This group is especially important because contains the oldest equipments and therefore with the highest probability to contain PCBs. This information was use as the base for the estimations presented in Tables 10 and 11. It is expected that the percentage of positive equipments in this group, the group with the oldest equipments, will be the same or higher than in the rest of equipments. Anyhow, the way to obtain more accurate results is to analyze the equipments according to the characteristics stated in the plates, providing there is no evidence that the oil has been changed. In order to confirm this change of oil it is useful to know that equipment undergoing this type of maintenance procedure usually have a second plate with the name and date of the company in charge of the change. The equipments can be grouped according to same year of manufacture and name of manufacturer and thus reducing in this way the amount of equipments to be analyzed to determine the content of PCBs. It is said that equipments with the same year of manufacture and manufacturer contain the same type of oil. This grouping system reduces the amount of tests to apply to determine the content of PCBs in the total of equipments.

In order to obtain a deeper analysis it is recommended to:

- Form groups according to year of manufacture and manufacturer.
- Take a representative sample for each group
- Conclude for the rest of the group from the results of the sample.

It is also important to collect information about the kVA of the suspicious equipments as to make closer estimations about the amount of PCBs.

Another important aspect observed during the analysis in the large amount of equipments giving false positive results. Tables 4 and 8 give results of the analysis of false positive with values over 90%. The reason for these values is unknown but the issue should be studied with care. In an intention to explain this behavior, 122 samples from 206 positive samples analyzed by the

ICE were treated with centrifugation to eliminate humidity. This procedure was performed by the laboratory LIMAT, entity part of ICE and the results are shown in Table 7; these results demonstrate that humidity in the samples produces false positives up to certain percentage, but this is not the only reason. As seen in Table 8, even after the process of elimination of the humidity, the percentage of false positive results is still very high.

Considering this situation it is advisable that the results of the inventory should not be based only on the analysis with the kit; a deeper study must determine the reasons for these false positive results. This situation could overestimate significantly the results of polluted equipments. For this reason in Costa Rica it was decided to apply centrifugation and double verification by chromatography. Though this procedure requires much more time and more resources for the analysis it could save time and money at the moment to define the treatment and final disposal of polluted equipments. It is important to clarify that the usefulness of the kit as a tool to separate those negative equipments is not being ignored but, the final diagnoses should not be based only on these results.

The information presented in Table 11 shows the estimated results for the total of the equipments in the country. The results are presented separately in ranges from the analysis made with the kit and with chromatography waiting for deeper conclusions about the reasons for the false positives with the kit test. As can be seen the difference is quite important when the two types of analysis are considered; the most correct form is to consider the value from the chromatographic analysis. It is also important to consider that the sample analyzed is slanted because it represents the oldest and out of use equipments and for this reason it can be expected an even lower percentage of positive results in the rest of the equipments.

An important aspect related with the inventory is the control that allows constant updating, already done in some of the companies. The ICE and CNFL as well as CoopeSantos have implemented a control system applied to the equipments taken to different maintenance places. In this way they are analyzed before they are receiving any type of manipulation of the oils. The presence of PCBs in the oil can then be detected and therefore there is a sustained control that defines use and management of the equipment depending on the presence or not of contamination. An adequate follow up of this information updates the information of the inventory related to the equipment in the network as they are submitted to maintenance. Though it is possible to make a preliminary estimation by extrapolating the data obtained in the sample of equipments inventoried up to this moment it is considered to be imprecise and on the contrary the common recommendation is to widen and structure these analysis practices to all the locations where there is direct manipulation of the oil from transformers. The information generated from the data base of each of the companies should be submitted to the *Secretaría Nacional para la Gestión Racional de Sustancias Químicas* through a new procedure for the handling of information that could be part of the National Implementation Plan of the country.

It is important to mention that no every company having its equipment in the plant offers a system of maintenance for such equipments. In this sense it is important to determine where are these companies sending their equipments to receive maintenance and thus focus on those companies the handling of the information.

During the stage of sampling it was evident that the conditions in these storage sites are totally deficient. In the great majority of the plants the equipments are out in the open, placed directly on the ground without any type of impermeabilization. Though not all of the equipments contain PCBs the chance of contamination of the ground cannot be ignored until an exhaustive analysis

of all the equipments has been done. The likelihood of ground contamination is higher in those places traditionally used for the storage of all and obsolete equipments. In order to define decontamination strategies it is necessary to count with an inventory of polluted sites which can be done along with electric enterprises involved in the matter.

Though the country has a national normative that prohibits the manufacture, importation, transit, registration, marketing and use of raw materials or manufactured product containing PCBs there are no guidelines with recommendations for the manipulation, handling, disposal and the compromise to declare the stocks of PCBs.

Though the amount of equipments containing oils in concentrations over 50 ppm is expected to be low there is a point of analysis that should be reconsidered. The maximum level permitted in the country is 50 ppm and according to this value the inventory procedures have been developed. Nevertheless there is a doubt about the existence of equipments which though their level of oil is less than 50 ppm of PCBs may contain concentrations between 1ppm and 50 ppm. In this sense it is necessary to come to a consensus on what would be the maximum limit that the country is willing to accept and which is the treatment and disposal that is desired for the positive equipments.

On the other hand it is important to consider that are no options for temporary storage or for the final disposal of polluted equipments. At this moment, those out of use equipments, polluted or not polluted are being stored in places not specifically designed for this purpose and do not comply with the safety characteristics that are necessary.

It is then necessary to formulate a national strategy for a sustained and adequate final treatment of the inventoried equipments. In the first place the new normative must regulate the limits and conditions for the manipulation of equipments with PCBs and should also define the procedures for the detection of polluted equipments, their storage, decontamination and final disposal. In this sense it would be advisable to have a common place for all the owners of electric equipment that could serve as temporary stocking center for those equipments out of use and where an adequate detection of positive equipments could be implemented, a good storage and an efficient final GESTION of the oils and polluted equipments. This type of strategy would enable the reunion of efforts that up to now have been an isolated enterprise of each one of the companies involved in the problem of PCBs.

4.1.5 Conclusions and recommendations

- The inventory data should be updated based on the analysis that the ICE is executing at this moment since this is the enterprise with the largest amount of equipments in the country, mainly in the plant at Miravalles. With this information the ICE will elaborate a detailed inventory with concentrations of the equipments turn positive by the kid.
- The resources available for the analysis should be used mainly in waste useless equipments. The rest of the equipments could be dynamically inventoried from adequate maintenance controls.
- It is necessary to make a deeper analysis in order to classify the total inventoried equipments into groups according to year of manufacture and manufacturer and the size (kVA) of the equipment. From these data it is possible to have a more precise conclusion about the positive equipments.

- The use of the kits for the analysis of PCBs is useful in making an initial selection of suspicious equipments but it is not a definitive analysis to establish the amount of equipments polluted with PCBs. Inventory results based on kit analysis may be overestimated for example; Humidity present in the oils can generate false positive results with the kit analysis.
- It is necessary to define a more exact procedure of analysis as to diminish the amount of false positive results obtained with the kit. This procedure should be used by all companies engaged in the handling of electric equipments in the country.
- It is necessary to define handling and analysis procedures to decrease the amount of false positives in the implementation of the kit. Such procedure should be spread among all entities related to the operation of electric equipment at a national level.
- It is necessary to establish a national norm with obligations for the owners of equipments with PCBs. Such norms should at least define procedures of analysis, procedures for the report of information in case of polluted equipments, recommendations for the manipulation and final disposal, among others. Also, to incorporate inventories results, performed by owners of equipments, to a database given by the MINAET and to transmitted to such entity and to make an annual report.
- It is necessary to establish an integrated updating procedure based on the analysis performed before maintenance. The procedure for the analysis and maintenance of the equipments must be uniform and implemented by all the companies handling oils.
- It is necessary to make an analysis of possible polluted sites and an evaluation of storage conditions for the equipments.
- It is necessary to establish a national norm for maximum limit allowed, management of information, handling recommendations, manipulation, storage and final disposal among others.
- Since 2001, under decree N°30050-S, manufacturing, import, traffic, registration, marketing and usage of raw material containing polychlorated biphenyls (PCBs), in order to insure an adequate management of polluted equipments in the country. In the norm, the establishing of a facility of temporary stocking and a plan of gradually eliminates transformers and polluted oils must be included in the norm. This will allow an adequate detection of polluted equipments, correct storage and a safe final disposal according to the Stockholm Agreement requirements.

4.2 Inventory of pesticides⁴⁴

During the years 2001 and 2002 the Instituto Regional de Estudios en Sustancias Tóxicas (IRET) coordinated and prepared the report called “Evaluación regional sobre sustancias tóxicas persistentes”. It comprehended 23 countries of Central America and the Caribbean. The report was done for GEF/PNUMA. In 2004 and 2005, under the direction of the Organización Panamericana de la Salud in Washington (OPS/OMS) and Coordinación Regional Proyecto DDT/GEF in Guatemala, the inventory of DDT and other COPs in Costa Rica was updated as well as the integration of the final report for the eight countries of Central America and Mexico. The work included an update of the amount, location and verification on the ground of COPs pesticides: DDT and some other already prohibited as mirex (dechlorane), aldrin, dieldrin, endrin, chlordane, heptachloride, toxaphene and hexachlorobenzene that would eventually be collected, packed and sent to an adequate final disposal.

For this inventory the IRET designed a format or guide with which the inventoried amounts were duly featured and contained detailed information about storage conditions, spatial location, contact names and photographs among others. Within the country the process made contact with different sectors, Health Ministry, Agriculture Ministry, universities, private enterprise, state banks and many other actors and visited many places and warehouses. In Costa Rica, 8.621.4 Kg of DDT were inventoried, 120 Kg of dieldrin and about 1.9 Kg of mirex; the first two in the warehouse of the Ministry of Health in Pavas and the last one in the warehouse of this same Ministry in San Ramón.

Finally in 2005 and 2006, the IRET made a pilot inventory of the COPs in Palmar Sur. No pesticides were found in the warehouses but there were evidences of buried materials. A methodological scheme was proposed for the rest of the country.

4.2.1 Methodology

Previous to this inventory a selection of the sites to study was done. It focused in those places where there was a higher possibility to find the COPs pesticides: DDT, mirex, (dechlorane), aldrin, dieldrin, endrin, chlordane, heptachloride, toxaphene and hexachlorobenzene mainly associated with the cultivation of banana, sugar cane, rice and coffee and applied at the end of the forties and beginning of nineties. Similarly it was considered important to include some obsolete pesticides as DBCP, parathion, 2,4-5-T, captan and lead arsenate. Sites as formulation places and large distributors of pesticides, fumigation air stations, State experimental farms and centers of education and research were also included in the inventory.

The ground work was organized by regions in the country. It started with initial direct contacts and some others counted with the support of employees of the Ministry of Health, who in the great part of the visits accompanied the people of the IRET. The meetings included interviews with administrative staff, Agricultural Engineers or agriculture workers, always people with more than 40 years of age. (Annex 2). Aspects as: the type of crops given before, the time, the way for development in the zone, the location of the warehouses and landing area for fumigation companies, the way of distribution for agricultural products, COPs pesticides and other products used in that area, the method of application, the place of the preparation of the mixtures, the

⁴⁴ Fournier, M.L., Ramírez, F. y Ruepert, C. (2007) Final report.“Inventory of COPs pesticides and some other obsolete pesticides in Costa Rica” IRET Instituto Regional de Estudios en Sustancias Tóxicas. Universidad Nacional, Heredia. DIGECA. MINAE

transportation of pesticides within the farm, the maintenances of the houses and the control of vectors and the location of waste places for packages and equipments in dumpsites and burials. GPS location of the places and relevant pictures were taken.

In those cases where the products found could not be identified, a sample was taken for further analysis. The protocol for sampling and analysis is shown in Annex 3. Monthly reports about the march of the work were submitted; the integration of all those reports forms the present document on the national inventory. Annex 2 contains the complete inventory of pesticides.

4.2.2 Results

a. Visited places

Annex 1 summarizes the information about all the places that were visited (Table 1) and the inventory of COPs pesticides, expired and obsolete is summarized in Table 2. The following is a detail of the general information collected in each one of the places ; the location of such places is presented in figure 6.



Figure 6 Places visited during the inventory for COPs pesticides and obsolescents

Table 33 Descriptive summary of the situation of pesticides in the places visited

Places	Descriptive summary of the situation ⁴⁵
1. Parrita and Quepos	Banana in the forties, replaced by palma africana, rice in 1965. Distribution center of pesticides in Damas. Warehouses for pesticides do not exist anymore. They had BOTADEROS for pesticides. They used COPs as insecticides, specially aldrin, chlordane,dieldrin and mirex.
2. Coto 47 and Golfito	Cultivation of African Palm. Warehouses in each farm. They used to bury plastic bags and wastes. BOTADEROS property of banana company, landing area for aerial fumigation, place for the mixture of pesticides.
3. Guápiles	Airport used for aerial fumigation, area for supplying airplanes. They used to prepare pesticides for banana and rice, External places for the treatment of residues of pesticides and containers with herbicides Experimental farm Los Diamantes, INTA, MAG with research activities and farming production. There is a general warehouse, a part of the warehouse is used to store pesticides, and some of them are expired.
4 Finca El Pelón de la Bajura in Bagaces	Rice in 1949. Now, besides rice and extensive cattle, melon, forest, GANADO ESTABULADO and tilapia. At the beginning they used chlordane against ticks (not only in animals but for human showers) and for the control of the red spider. Once it was prohibited they spent the stocks. Two pesticides have been used again for the production of rice: TRIAZOFOS Y TERBUFOS Warehouses for pesticides used with rice and melon, an hangar for aerial fumigation and recycling warehouse, a drainage for the washing of the application equipment that consists of one sink and the drainage . This same place is used to dispose little amounts of expired pesticides
5. Formuladora MAQUISA	Plant for the formulation of nematicides, specially terbufos and forato used in bananas. In 1980 the company started to formulate for Bayer and then it was acquired by Bioquím. Empty barrels are returned to Bioquím in Cartago.
6. Finca La Cueva en Liberia	Cotton between 1978 and 1982, then it became property of DEMASA cultivating corn from 1982 to 1999 since then it cultivates melon with more than 1000 Ha per year. Has the policy of reducing the use of pesticides and stopped the use of some as tamaron (metamidofos) . They are also trying to reduce the use of endosulfan y metomil intending to eliminate them in 2008
7. CATSA Central Azucarera del Tempisque	Before sugar cane it was zone of paddocks, forests and rice. With rice they used 2,4,5-T and some chlorinated compounds. In sugarcane production in the region they used granulated heptachlorides which was applied for the control of jobotos . At the end of the eighties and as result of the DIECA research they stopped the use of insecticides in the production of sugarcane. A warehouse for pesticides in Polvazales. Ministry of Health is in charge of surveillance. There are no residues of chlorinated pesticides or obsoletes in the warehouses..
8. Azucarera El Viejo en Filadelfia	Exclusive cultivation of sugarcane, they have a sugar mill since the fifties. Some time ago they had, besides sugarcane, rice, cotton and meta cattle. During the seventies they applied heptachloride but not anymore. The majority of pesticides applied are herbicides; never used 2,4,5-T. For two years after the prohibition for chlorates they used terbufos for ground insects.
9. Hacienda Mojica en Cañas	Traditionally rice producers, now they cultivate sugarcane, cotton and tilapia. Since the years 60-65 cotton, rice and sorgo . They report

⁴⁵ Complete description in the inventory in the annex

Places	Descriptive summary of the situation⁴⁵
	having never used chlorates in their agricultural activities.
10. Hacienda Taboga en Cañas	Since 1958 sugarcane and since 1986 they cultivate rice in order to rotate the soil. It was a cattle farm and had forests. They apply the triple washing to containers in order to return them to the suppliers.
11. Rancho Horizontes en Bagaces	It was not possible to visit the farm, the person in charge said he is in charge since a year ago.
12. Formuquisa en Punta Morales	Certified ISO 14000 and ISO 9000. Dedicated to the formulation of some pesticides as mancozeb, clorotalonil, clorpirimifos, carbendazina, captan, DBDP, pendimetalina, 2,4-D, metiltiofanato, glifosato, paraquat, terbufos, metalaxil and metaldehido, for transnational firms such as Bayer, Syngenta, BASF and Trisam, among others. The only COP that they formulated once was heptachloride (clorahep); they do not formulate endosulfan. There is a burner for packages and sinks for the degradation of residues.
13. Hacienda San Agustín en Chomes	300 cabezas de ganado , cultivation of sugarcane, rice and transgenic cotton; cotton is fumigated by air with metilparathion Some time ago they buried and burned expired and obsolete pesticides Some of the pesticides in use at this moment are: glisofato, 2,4-D, endosulfan (applied to rice with a tractor) aplicado en arroz con tractor, butaclor y terbufos. In the warehouse <u>there are products to eliminate</u> : 8 L of the herbicidad Command-48EC (clomazone) and 8 kg of fungicidal vitavax (captan or carboxin).
14. Azucarera El Palmar en Cuatro Cruces de Miramar	Sugarcane since the fifties. They have a system of internal environmental GESTION and another one, not certified, from la Liga de la Caña. They count with an <u>inventory of expired pesticides in a warehouse</u> which is all, separated and under vigilance
15. Fertica en Puntarenas	Engaged exclusively to the production of fertilizers; no existence of pesticides
16. CURDTS Colegio Universitario de Riego del Trópico Seco en Cañas	Low Risk Production (rice, melon, sugarcane, hidropónia) In the old warehouse of the MAG now they have showers but the smell to pesticides is still active; in the new warehouse they only have veterinary products and authorized pesticides, they do not use endosulfan.
17. Estación Experimental Enrique Jiménez Núñez del INTA en Cañas	For agricultural research. There is a new warehouse for pesticides but <u>expired pesticides</u> were moved from there and placed outside at the edge of a channel, they are in the open, partially covered with plastic and on a wooden shelf causing leakages on the ground because some containers are broken.
18. Hacienda Atirro en La Suiza de Turrialba	Production and industrialization of sugarcane. About ten years ago they stopped the use of insecticides, and only herbicides in the case of pesticides. Empty containers are not received by the Cámara de Cañeros, so they use them again for pesticides and then burn them in the sugar mill
19. Finca Comercial CATIE	Very old warehouse, since 1949 in the time of IICA Instituto Latinoamericano de Ciencias Agrícolas. They store there some pesticides for commercial areas of the CATIE related to sugarcane, coffee and grass and in smaller degree, orange, lemon and plantain . No COPs pesticides were found there but a huge amount of <u>expired pesticides, they are interested in eliminate completely from the place.</u> Inside the CATIE campus there is a warehouse of agro chemical products used in Entomology. An inventory showed no presence of

Places	Descriptive summary of the situation⁴⁵
	COPs but a lot of <u>expired products</u> . Old warehouse covered with weeds, CATIE, belonged to the old project MIP, CATIE and was used by the researchers. The project ended and the great part of the products has remained there. There are pesticides with more than 15 years there. Some containers are damaged, the contents have been taken and through chemical processes have been neutralized but the concern is how to dispose them. The inventory showed the absence of COPs but a big amount of <u>expired pesticides, the great majority in broken containers with some leakages and in bad general conditions</u>
20. Hacienda Juan Viñas	Coffee and sugarcane, about 40 years of history. They see these activities but have diversified with macadamia and vegetables. Warehouse for pesticides in the sugar mill, it is supervised by the MAG every four months to detect expired products, without label and with leakages. No expired products and no obsolete products.
21. Ingenio La Argentina en Grecia	Only one warehouse for pesticides, one little shelf with <u>expired products</u> :
22. Coope Victoria en Grecia	In the store no expired or obsolete products as they are under monthly surveillance by the MAG, Ministry of Health and the Colegio de Ingenieros Agrónomos. The center for the collection of containers is being built; farmers use to bury or burn their wastes. Use of endosulfan in the cultivation of coffee to control the presence of broca . Some farmers use lead arsenate to control ojo de gallo . This product is prohibited in Costa Rica but it is illegally brought from Nicaragua. In Tacares, Grecia, where they cultivate tomatoe there is a place called "the street of cancer", because every year several persons die from this disease
23. Finca La Emilia en San Luis de San Isidro de Alajuela	Coffee, 3 coffee mills and a total of 1.400 ha of coffee plantations in the neighborhood of Volcán Poás in Alajuela, Direct exporters. Cultivate between 1200 and 1550 msnm with low use of agrochemicals, 60% of the products used are organic.
24. Coope Libertad en Heredia Centro	Certified coffee plantations, no COPs, expired or obsolete products in the supplies warehouse. Regularly supervised by the MAG, Ministry of Health and Colegio de Ingenieros Agrónomos
25. Sarchí de Valverde Vega	Centro Agrícola Cantonal where all the products are valid and there are no COPs. remnants . The residues of lead arsenate were probably used, they do not use endosulfan
26. Formuladoras de Cartago	INQUISA: formulation of some insecticides as cipermetrina, clorpirifos, endosulfan and metamidofos; fungicides as carbendazina, clorotalonil, mancozeb and captan; herbicides as 2-4 D and paraquat; and mematicides as terbufos y carbofuran. The enterprise has the Ecologic Flag given by MINAE since 4 years ago; containers are triple washed and sent to the burner in cementera Holcim AGROTICO: re package, selling and distribution of agrochemicals. Started producing paraquat and 2-4D. At this moment they do not produce endosulfan, but are trying to register for the production. Polluted residues are stored, others are triple washed and sent to Holcim, the washing waters are sent to the degradation pool. BIOQUIM: formulates 2-4 D, glifosato, paraquat and diuron, among others. Liquid wastes go to an evaporation sink; solid residues are sent to the WPP's relleno sanitario in Cartago or barrels are sold to the chatarreras .
27. Finca Santa Lucía, Escuela de	The pesticides warehouse of the experimental farm of the UNA is located between Heredia and Barva. There was found a paper bag of

Places	Descriptive summary of the situation⁴⁵
Ciencias Agrarias, Universidad Nacional	23 kg with the <u>COP Aldrin 25% P.M.</u> , comercial firm Chevron and Ortho; the bag is in good condition and closed. Two cartón containers of 200 and 100 liters of capacity were also found. They contained a white powder (bone white) incide a plastic bag with about 70 and 50 Kg of product respectively. Both had no identification; samples were taken to sent to laboratory (LAREP from IRET) for residue analysis. Another finding was a glass bottle with 250 g of granulated product labeled as <u>Heptacloro</u> 5%, a third sample was taken for analysis. The results of the analysis are presented in Annex 3. Only with sample 3 they confirmed the presence of heptachloride and its two metabolites: chlordane and nonaclor. The other <u>expired pesticides found</u> are in Table 2.
28. Finca Fabio Baudrit, La Garita, Universidad de Costa Rica	In main warehouse for herbicides, vegetables and fruits no COPs were found but some <u>expired pesticides</u> In the warehouse for vegetables there had <u>expired pesticides in very bad conditions of package and preservation</u> , for this reason it was not possible to make an inventory, it will be necessary to have protective equipment to do so. The pesticides in the fruit warehouse have been there for more than 15 years.
29. Antiguo campo de aterrizaje en Cariari, Guápiles	It was a banana production site without houses, now there are people living there. One of the houses was built on the concrete base of the old pesticides warehouse of the plantation. From this point they were distributed to the rest of the plantations. Behind the house they used to have the tank were the mixtures were prepared. One man who worked applying pesticides said he worked with aldrin for the field and DDT for the houses in the control of vectors but does not remember having buried or burned.
30. Sixaola	In one banana farm three places where they used to bury the barrels were revised, the holes were 3 x 3 x 4 meters. Barrels come from Siquirres but they had come from zona sur.

4.2.3 Findings

- Of all the places that were visited only one had COPs pesticides, 23 Kg of aldrin and 250 mg of heptachloride in a warehouse in Finca Santa Lucía de la Universidad Nacional en Heredia.
- In none of the placed that were visited could be inventoried the presence of the obsolete pesticides DBCP, parathion, 2,4,5-T, captafol and lead arsenate but a lot of expired pesticides were inventoried
- In almost the third part of the place was possible to detect the presence of expired pesticides and among these 75% could be found in warehouses property of centers of research and experimentation from the sectors of superior education or the Government; the list of expired pesticides and the corresponding amounts are detailed in Table 2 (annex 1).

4.2.4. Conclusions and recommendations

The general feeling received from the visit to the different agricultural enterprises is that the total inventories of COPs pesticides and obsolete pesticides were completely applied in their

cultivation fields during the period that followed the prohibition. Some farmers still think that the absence of such products is negative because of the high effectiveness in the control of pests; for example, lead arsenate as fungicidal in coffee crops and mirex for the control of ants.

In general those large farms have renewed the infrastructure of their warehouses and some of them have environmental certifications; this is a guarantee that valid agrochemical products are being well stored and given the adequate maintenance. But the situation is quite different in experimental farms; old products and tests remnants are being inadequately stored.

The management of expired pesticides, containers and packages deserves a special consideration in this country and it demands a national strategy for the proper disposal of these wastes. Among the substances found, the most critical in view of toxicity, persistence and the skill to move in the environment are: insecticides/nematicides, aldicarb, carbofuran, etopros, metamidofos and terbufos; the herbicidal paraquat and diquat and the fungicidal captan. Besides this situation, the products are stored in inadequate places, a lot of them have broken or rusted containers and many of them lack a label. The vulnerability of these remnants to situations of emergency like earthquakes, floods, fire or robbery turns them into a potential risk of contamination of superficial and subterranean waters, fauna and could eventually generate exposure to the population.

The total of pesticides that was possible to quantify is the following: 23,25 kg of COPs and 1.027,62 L and 409,2 kg of expired pesticides; in relation to obsolete pesticides (DBCP) there are no data about the bury of these substances. The usage of burying expired and obsolete pesticides has been very common in this country but the information about it is very limited. There is one place near Sixaola and the region around Palmar Sur and the possibility of other areas for the burial of DBCP in Roxana and Valle de la Estrella.

People do not know where to take these products and for this reason the procedure mentioned in common. There is poor criterion about the selection of the sites and about the negative impact on the physical, biological and human environment. In consideration of this problem the country needs the establishment of a collection site for those expired and obsolete pesticides along with a national campaign to provide adequate information about the risks of maintaining or eliminating these products in an inadequate manner and the search for financial support to carry on the disposal.

Recommendations:

- To offer the agricultural producers a more agile option for returning their expired or obsolete pesticides by the establishment of collection sites in various regions of the country along with an adequate elimination system for these dangerous wastes.
- To establish an informative campaign to impulse the safe and correct elimination in order to reduce environmental risks due to these expired or obsolete pesticides.
- To implement a permanent inventory of the burying sites and start a program of attention to the ones already identified including a diagnoses and analysis of the risk in each situation and the remedial measures.

- Involve the different state entities and MUNICIPIOS and other organizations in this process. Considering the environmental risks derived from the burying of pesticides the entity in charge should be MINAE.
- To carry out efforts to determine if there is illegal traffic of some POPs pesticides and to implement the corresponding actions.

4.3 Dioxins and Furans Inventory⁴⁶

This inventory includes the results of the first national compilation of information for the quantification of the release of dioxins and furans (**PCDD y PCDF**). The year 2005 was selected as reference for which the process started on October 2006. The quantification release results are the product of the application of the standardized instrument prepared by the United Nations Environment Programme (hereafter *toolkit*), in its edition 2005 [1] and the project was coordinated by the Environmental Quality Management Department (DGECA) of the **Ministerio de Ambiente y Energía**.

Due to the fact that there does not exist national inventory precedents neither sectorial study related to the release of dioxins and furans, this inventory has as objectives:

1. To establish a guideline concerning nationwide dioxins and furans release.
2. To determine the sectors that show major releases to make a priority the necessary actions for the formulation of the Implementation National Plan (INP) for POPs, in compliance with the Stockholm Agreement ratified by Costa Rica on November 2006.
3. To contribute with the improvement of the databases to accomplish centralized and appropriate information that facilitates the process of future quantifications.

Due to the number of relatives in every kind, dioxins and furans chemical analyses are difficult and expensive. No industry or governmental institution provided real measure data that might be compared to the estimate of the estimated releases based on the *toolkit*.

Identification of PCDD/PCDF generation places was an important stage in the application of the methodology of the *toolkit*, because it allowed planning of the data compilation. While obtaining data from some sectors it was possible to access governmental institutions or specific sectorial organizations databases that facilitate the process making unnecessary a great number of individual interviews.

4.3.1 Methodology

Preparation of the present inventory was performed in four stages according to the following diagram. Reference year for the inventory is the year 2005. Processing of data was performed based on the *toolkit* created by the PNUMA [1] with some modifications in release factors that will be mentioned in every particular case.

⁴⁶ Quesada, Romero y Roa (2008) Dioxins and Furans National Inventory. Costa Rica. Stockholm Agreement for Persistent Organic Pollutants POPs. DGECA. **MINAE**

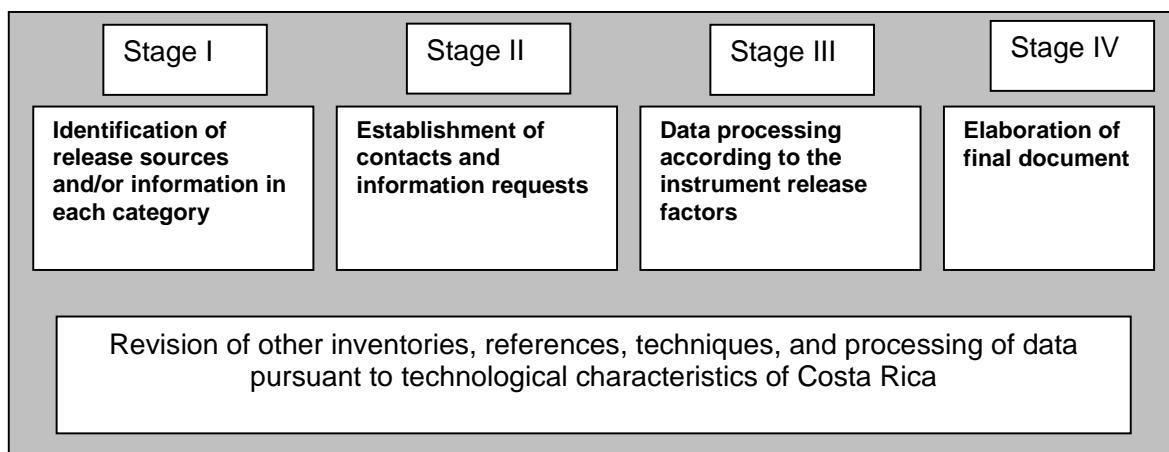


Figure 7. Methodology for the elaboration of the Dioxins and Furans National Inventory; year 2005, Costa Rica

Release quantification can be based on results of chemical analysis or estimates. Identified release sources have no real data; therefore, the results that will be established are estimations. Calculation of releases in each compartment comes from the following formula (Eq.2).

Dioxins and Furans releases (EQT)

$$= \text{Activity rate} \times \text{release factor} \quad (\text{Eq.2})$$

Activity rate refers to annual production or annual consumption. These data were provided by different identified release sources and in some cases estimated from centralized information in institutions or organizations of the specific sector. Release factor for every compartment in every subcategory is normally provided by the *toolkit* [1]. Contributions from every category and subcategory in every compartment were quantified in this manner. In those cases with no release factors it was not possible to quantify the contribution.

The instrument groups different release sources in 10 categories. Group corresponds to typical characteristics of every release source, technologies applied and to the compartments they contribute.

In the Final Report document are all the details of the Dioxins and Furans National Inventory⁴⁷

⁴⁷ Quesada, Romero y Roa (2008) Dioxins and Furans National Inventory. Costa Rica. Stockholm Agreement for Persistent Organic Pollutants POPs. DIGECA. MINAE

Table 34 Release Vectors of the categories of the Dioxins and Furans Inventory

No.	Categories	Possible Release Routes				
		Air	Water	Land	Product	Residue
1	Residue Incineration	X				X
2	Manufacture of ferrous metals and non ferrous	X				X
3	Energy and heat generation	X		X		X
4	Mineral production	X				X
5	Transportation	X				
6	Non-controlled combustion process	X	X	X		X
7	Manufacture and usage of chemical substances and consumption goods	X	X		X	X
8	Various	X	X	X	X	X
9	Handling and disposal of wastes	X	X	X		X
10	Identification of potential hot places	Registration is possible only by evaluation of the specific place				

4.3.2 Results

Table 35 shows activities contemplated in the *toolkit* that existed in the country in the year 2005

Table 35 Existing activities in Costa Rica in 2005 by category

Category	subcategory	Class
1: Residue Incineration	1b Incineration of dangerous residues	
2: Manufacture of ferrous metals and non-ferrous	2.c Manufacture and smelting of iron and steel	2. Smelting 3. Galvanize facilities
	2.e Manufacture of aluminum	1. Aluminum scrap processing, minimal treatment on entry material and simple dust retention
	2.f Manufacture of lead	2. Lead manufacture from free PVC/Cl; any SCCA scrap
	2.h Manufacture of bronze and brass	2. Simple smelting
	2.i Thermal recovery of copper from cables	1. Open sky cable burn
3: Energy and heat generation	3.a. Fossil fuels electric power station	3.a.3 Energy calderas that burn heavy oil 3.a.3 Generation facilities that burn heavy oil 3.a.5 Energy facilities that burn light oil/natural gas 3.a.5 Energy calderas that burn light oil/natural gas
	3.b. Biomass electric	3.b.1 Biomass powered calderas (ex. wood)

Category	subcategory	Class
	facilities	
	3.c. Gas combustion from landfills, biogas	3.c.1 Calderas that burn filling gas/biogas, engines/turbines/torch, burn with flame
	3.d. Biomass combustion for domestic use (heating, cooking)	3.d.2 Stoves powered by wood/biomass
4 Mineral products	4.a. Cement ovens	4.a.4 Humid ovens, temperature of PES/FT <200°C and every type of precalciner/preheater, temperature <200°C
	4.b. Lime	4.b.1 Cyclone/no dust control, deficient or polluting fuels
	4.c. Brick	4.c.1 Cyclone/no dust control, deficient or polluting fuels
	4.d. Glass	4.d.2 Good dust retention
	4.e Pottery	4.e.2 Good dust retention
	4.f Asphalt mixing	4.f.1 Free gas purge mixing facilities
	5.a Gas 4 stroke engines	5.a.2 Unleaded fuel, without catalyst
5: Transportation	5.a.3 Unleaded fuel, with catalyst	
	5.b Gas 2 stroke engine	5.b.2 Unleaded fuel, with catalyst
	5.c Diesel engines	
6- Open sky combustion	6.a Biomass burning	1 Forest fires
		2 Meadow and heather fires
		3. Agricultural residues burning (in the field), impacted, in deficiency combustion conditions
	6.b Wastes burning and accidental fires	1. Dump fires/sanitary landfills
		2. Accidental fires in houses, factories
		3. Uncontrolled burning of domestic wastes
		4. Accidental vehicle fires
	7.a Pasta and paper factories	7.a Pasta and paper factories
		9. Papers/recycle pulps from modern papers
7- Manufacture and usage of chemical substances and consumption goods	7.b Chemical industry	4. Acetic, 2,4- dichlorophenoxyacetic (2,4-D)
	7.c Petroleum industry	1. All types (torches)
		2. Lower limit
8: Various	8.b Crematoriums	1. Without control (for cremation)
		2. Intermediate control (for cremation)
		3. Optimal control (for cremation)
	8.d. Dry cleaning residues	1. Heavy textiles, treated with PCP, etc.
		2. Regular textiles
9:Final disposal and sanitary landfills	8.e Tobacco consumption	1. Pure Cigars (per unit)
		2. Cigarette (per unit)
	9.a Landfills leachates	1. Dangerous wastes *
		2. Non dangerous wastes *
	9.b Sewage and their treatment	1.Industrial, domestic, mixed with possibility of chlorine
		Without mud evacuation
		2. Urban environment
10: Hot places	9.c Water pouring	Without mud evacuation
	9.d Compostado	2. Urban environment
		1.All organic parts
	Chlorine manufacture places	
	Places of application of chlorinated phenols	
	PCP or their salts wood treatment places	
	Oils with PCBs	

Category	subcategory	Class
	Dumps of any of the previous categories	
	Places where relevant accidents happened	
	Sediments dredge	
	Caolina or plastic clay warehouse	

4.3.2.1 Summary of results and observations by category

a. Category 2 metals:

- Total estimated releases for this category represent 42% of the grand total of the inventory. According to the *toolkit*, the forms of liberation of this category are residue and air.
- Release in residue represent 42% of the grand total (all categories), and 68% of total releases in residue.
- Air release, thermal recovery of copper represented more than 50% in current estimation and aluminum production represented 41%. Both activities might be underestimated because they have irregularity components of great importance quite difficult to determine.
- Galvanized represented a 99.8% of total PCDD / PCDF releases, and 99.9% of those in residues, quantified by the *toolkit*.
- It is relevant that the release mitigating effects in residue (99.87% of the category total and 42% of the grand total) are available, contrary to what happens in other ways, particularly air. Production volume so high in the galvanize activity guarantee that the relation between different category contributions will not change significantly in a future inventory, unless release factors change drastically.

b. Category 3: Energy and heat generation

- Subcategories with major contributions are those related to biomass. Domestic stove contributions powered by wood are the major contributions representing 76.7% while calderas powered by biomass represent a 23.2%. In both cases, the number is modest because, in the first case, the contributions of restaurants with brasserie are not included, and in the second case, data from the calderas powered by wood have not been included because there is no information.
- Contributions corresponding to energy and heat generation with fossils fuels are not significant, probably for their low emissions factors combined with the fact that for Costa Rica the principal generation source is hydroelectric.

c. Category 4: Mineral Products

- According to the *toolkit*, dioxins and furans total release for this category is 2.833 g EQT that represent a 0.58% of total releases.
- The asphalt mixing represented the biggest contribution of the category (96.5%), while the cement industry contributed a 2.5% and glass industry a 1%.

- It is important to have in mind that the final result has an error due to the contribution of the calderas omission because quantification and fuel type used in the ovens of the calderas do not exist.

d. Category 5: Transportation

- According to the *toolkit*, the quantified contribution to this category represented a 0.04% (four ten thousandth) of the grand total, and 0.1% (one thousandth) of total air releases that, according to the *toolkit*, is the only way of liberation.
- With a consumption of almost a 6% of total gas contribution, 2 stroke engine contributions is similar to those of the other two subcategories together (gas and diesel). This suggests a priority attention area in the transportation category, especially having in mind that motorcycles are more popular every day, and it is easier to purchase a four stroke one. On the other hand, the fact that every vehicle and oil for every 2 stroke engine is imported could facilitate release PCDD/PCDF control policy implementation per transportation.
- *toolkit* does not consider vehicle maintenance activities that might be generating residue emissions like ruled out catalysts and the handling of ruled out lube oil.

e. Category 6- Open sky combustion

- Category 6 contributed with 262 g EQT 55% of estimated releases according to the *toolkit*.
- 58% of the releases of this category were on air, the remaining on residue (35%) or on land (7.5%).
- Major contribution to this category was presented by the subcategory b: fires, wastes burning, landfills fires, industrial fires, accidental fires, with a total of about 184 g EQT/a equivalent to almost 70% of total category releases.
- Subcategory a: burnings/biomass fires with releases of almost 84 g EQT/a contributes with almost 30 % of the category total. Major contributions are of class 3: agricultural residues burning (in the field), impacted in deficiency combustion conditions. This class with almost 30 g EQT/a that represents almost the entire subcategory contribution (29% of the total). Major contribution of this class within the subcategory is because of the great burned biomass quantity in agricultural activities like the use of bigger release factor than in classes 1 and 2 of the subcategory.
- Subcategory (b), wastes burning in dumps (class 1) uncontrolled domestic waste burning (class 3) represent almost 25% and 16% of the releases respectively.
- The other activity the mostly contributes (27%) with releases is the accidental house and factory burns.
- Although in subcategory (a) the total amount of burned material is more than fifteen times the amount of subcategory (b), the high release factors values for the classes of the second subcategory result in a major amount of PCDD/PCDF emissions.

f. Category 7- Manufacture and usage of chemical substances and consumption goods

- This category contributes with an annual total release of almost 2.2 g EQT equivalent to a 0.45% of the grand total obtained by instrumental [1].

- Among the activities of this category, in Costa Rica major contribution (almost 98%) is recycled paper from modern paper due to residues generated mainly by the burning of wood in calderas.
- Chemical industry had a low contribution (approximately 1.7%) due to the pollution presented in imported chemical products because local industry of this type of products is null.
- Contribution of textile industry is very low mainly because it uses non impacted pentachlorophenol raw material and different coloring derived from chloranil.
- Contributions of the petroleum industry are by the burning of torches and it is not significantly in comparison to the rest of the category.

g. Category 8: Various

- Information gathered for this category did not allow making an entire estimate of PCDD/PCDF releases and consequently the cremations contributions during the year 2005 were omitted as well as those of dry cleaning. In this last category (8.d.), industries do not have files of the solvents used or of the amount or the type of material that were cleaned. The operation permission should demand a residue handling plan because, according to the interviews conducted there is no knowledge of the environmental problematic related to service sector.
- In general, with the information available for this category the estimated of their contributions to the PCDD/PCDF releases was not significant (less than a millionth of the total estimated for the country).

h. Category 9: Final Disposal and Sanitary Landfills

- This category, according to the current estimate, contributed 2.84 gEQT equivalents to 0.60% of the grand total.
- 86% were released through the product and 16% through water. This represented 96% of the products estimated releases and 100% water releases as calculated by the instrumental (*toolkit*). Apparently, the *toolkit* has in consideration all water releases in this category, a detail that could be improved in future editions.
- 84% of the releases were in the **composteo** activity and almost 15% by treated sewage.
- The high percentage of the releases related to the **composteo** was because of frequent use of pesticides and herbicides in agricultural activities.
- It must also be considered that the instrumental presents a serious deficiency in the sewage case that it is simply pour with any treatment whatsoever. In this case, the instrumental has in consideration release factors a magnitude order less than the case in which the water treatment is done and, additionally, no residue is considered. For that reason, applying the instrumental in poured water with no treatment, dioxins and furans releases are less than 1% of the total of the category.

i. Category 10: Hot Places

- In the country, there are many places where parts of vehicles polluted with oils and plastics, like mufflers, muffle, catalysts, engines parts, and brake parts are accumulated and burnt.
- Exhausted Lube oil burning in bakery ovens is an extreme example, although in a small scale, of this activity. Is a massive practice in the country that industries that require fuels like the metallurgic industry or lime ovens (calderas) use fuel wastes of other industries regardless of what they have mainly because they are cheaper or given away.

An aggravating is that, generally, industries do not have pollution control systems. In some cases, it is added that they are near houses or crops.

- A common practice in several regions of the country is to sweep the residues into the backyard and in front of the house, and to burn them. The practice is even more common in low regions and in the coast. It is equally common that at the beaches, visitors as well as locals pile up wastes that the sea has brought. The chloride content of these wastes, in many cases biomassic, is very high, therefore a high PCDD/PCDF production.
- In the country there are innumerable waste dumps, some are in charge of the municipalities, some simply of public knowledge with any person responsible. There is no quantification of the income in these dumps, nor control of what enters. Often they are burnt, to reduce the volume or for any other purpose. These dumps and informal garbage warehouse could represent an important contribution and should be considered in any case in futures inventories.
- The instrumental used shows release factors of a part of the implicit cases but it excludes many. For example, in thermal copper recovery there are release factors unique for the case of air because at the present there does not exist for residues, and in the case of land by open sky cable burning there are also no release factors. In a quick review of the electronic sheet of the instrument can be noticed that at least 20% of the cases that deserve it are not covered, that means that the corresponding release factor has not been determined. There exist susceptible activities of producing PCDD/PCDF that are no considered as well as considered activities forms that have been omitted.

4.3.2.2 Results Summary

- 97% of the liberations came from two categories: metal manufacture (42%) and open sky fire processes (55%).
- Of the remaining categories, only three exceeded 0.5% of the total, that are the energy and heat generation (1.15%), final disposal (0.6%) and mineral products (0.6%).
- Chemical products manufacture contributes with 0.46% while incineration (0.05%) and transportation (0.04%) in their group, result in contribution lower than 0.1%.
- Reservoirs that were affected the most were air and residues.
- Each release way had one or two predominant contributions.
 - Air had a predominant contribution in the category of open sky burnings (94.5%).
 - Residues have important contributions by metal manufacture (68.3%) and open sky burnings (31.0%).
 - Water and land reservoirs had, according to the tool applied, contributions from an only category: final disposal and open sky burnings, respectively.
 - The “product” reservoir has the contributions of two categories but mainly from the final disposal category by the **composteo** activity (96%).
- Even though, open sky burnings contribute with more than half of quantified releases, they were closely followed by metal manufacture.
- Categories with biggest contributions.

- Metal manufacture and open sky burnings categories contribute with 97% of the PCDD/PCDF quantified releases during 2005. The remaining was lower than 3%.
- Open sky burnings (6) category contributed 55% of the grand total of the liberations. Through air 32% of the grand total was released, through land 4.6% of the grand total, and through residue 19% of the grand total in this category.
- Metal manufacture category contributed 42% of the total quantified releases. Almost the entire amount of these was released through residue

4.3.3 Conclusions

1. The application of the *toolkit* resulted in a total quantified releases of 476 gEQT during 2005 with a 95% in residue and air (61.6% and 33.6% respectively). This must be considered as the first partial quantification because for many of the cases there is no data that allow quantifying the contributions and, moreover, some upsets were found between some suppositions that were the base line of the *toolkit* and local reality.
2. However, even though the *toolkit* applied in the nationwide quantification of PCDD/PCDF releases is revision process and improvement it contributes with valuable criteria to start actions that could have very tangible effects in the context of Costa Rica, and to establish a priority action baseline on others.
3. The matter of fact that the 99.9% of the metal manufacture releases were in the galvanize industry, and of them almost the total amount stayed in residues (41% of total PCDD/PCDF releases) it clearly suggests an action baseline that can be addressed promptly. Almost the entire amount of the galvanize industry production of Costa Rica comes from highly technified industries with modern pollution and well maintained controls. In industries with these characteristics is expected that great part of PCDD/PCDF releases would be in residue. A minor adjustment in a cleaner manufacturing with the purpose of destroying trapped PCDD/PCDF with the residues is available. Similar actions baselines will probably be of help to attend other industries with good pollution control systems.
4. Through residue 62% of total PCDD/PCDF was released.
5. Besides metal manufacture, another great contributions to this reservoir is open sky burnings (19% of the grand total), that also contributed with 4.1% of the grand total through land that adds up to 23%. Of the contribution of open sky burnings to land and residue, two thirds are from activities susceptible to reduce (agricultural residues burning, dumps fires, and domestic residue burning). It is important to consider these releases through residue and through land that represented 66% of the grand total maintain relatively concentrated in the fire area that give them a particular dangerousness in comparison to those that are disperse; for example, those that are in air or water.
5. The fact that open sky burnings represent more than the half of quantified releases during 2005 (55%) suggests action baselines that might be addressed to great plurality of actors and factors. The fact that 58% of the contribution of the category (32% of the total) goes through air could confer to the category an exceptional relevance from public health point of view since a third of the PCDD/PCDF releases spread throughout the national territory. It is of interest to notice that open sky burnings represent a 95% of air releases in this quantification. Educational campaigns and many sectors involvement will probably be key ingredients of the action plan for this category.

6. Air release from open sky burnings, three quarters of those from activities susceptible to reduce (agricultural residues burnings, dumps fires, and domestic residues burnings).
7. With this, 97% (categories 2 and 6) of the grand total of quantified releases during 2005 seems to be susceptible to reduce in significant manner two actions lines. This suggests the establishment of priorities in the elaboration of an action plan for the decrease of liberations for what this inventory must be a fundamental baseline.
8. At the moment, it is important to recall that an important part of PCDD/PCDF release sources was unnoticed because while the activity was considered in the instrumental there do not exist release factors may be because the activity was not considered by the instrumental. This is an action field that might worth including in the action plan.
9. Finally, toolkit application in the Costa Rican context does not deserve comment because important difficulties of the country and the moment were presented. To obtain necessary information, there was a high dependency on primary sources and there were not enough entities that centralize the information. Additionally, some primary sources do not provide easily the information because they do not have it available, distrust or lack of interest. This will result in a challenge for future inventory editions, but at the same time suggests management and control actions that might be convenient to undertake for the corresponding governmental entities

4.4 Inventory of Installed Capacity in Laboratories⁴⁸

The main commitment of the Stockholm Agreement is to reduce in great number and even definitely POPs emissions. The strategy that allows reducing these emissions necessarily requires of monitoring and estimates that permit define the initial status and monitor and control later improvements shown in emission decrease. For this reason it is necessary to conduct a nationwide study that allows determining the laboratory capacity of POPs analysis.

The support of the laboratories is essential for the performing of inventory necessary analyses in the evaluation of polluted places and emissions as well as follow up activities assistance and control of established objectives as part of the Application National Plan.

Nationwide, the analyses of POPs substances has been historically oriented to pesticides for their high agricultural production levels. However, due to necessity of controlling by the approval of the agreement, demands of other international norms, and as research initiatives to analyze the impact of these substances. Some laboratories have implemented PCBs and dioxins and furans analysis methods although, in less quantities. However, there is no standardized information about which and what amount of laboratories provide the service, prices among others.

⁴⁸ Alfaro, C. (2007) EVALUACIÓN DE LAS CAPACIDADES EXISTENTES E INFRAESTRUCTURA PARA EL ANALISIS DE COMPUESTOS ORGÁNICOS PERSISTENTES COP'S. IMPLEMENTATION NATIONAL PLAN. DIGECA. MINAE

The objective of this inventory was to perform a nationwide analytical capacity analysis of the laboratories that perform Persistent Organic Pollutants (POPs) analysis. In the appendix 4, the complete laboratories installed capacity inventory is shown.

The study includes laboratories that are currently performing POPs analyses until August 2007. To avoid information that could not be verified, laboratories that plan in the future to perform related tests are not included. Some laboratories that are considered essential in the POPs life cycle that have the capacity of performing analysis (laboratories with proper equipment and personnel) but do not have the tests ready are mentioned separately.

Mentioned Credited laboratories refer to credited scopes against norm INTE-ISO/IEC 17025:2005 valid since June 1st 2007 according to the Costa Rican Accreditation Entity

4.4.1 Methodology

A list of nationwide chemical analysis laboratories that perform POPs analyses was compiled. Laboratories of governmental institutions (universities, ministries, institutes) and also laboratories that provide the service to the private sector were included. To locate governmental institutions laboratories and research facilities the information about provided services of the institution according to the information on the web pages of the ministries, universities and research facilities was verified. Private laboratories were selected according to the information about laboratories with credited tests of the ECA. Afterwards, it was directly verified with the people in charge of governmental and private laboratories if the laboratory actually provides POPs analysis.

From the initial revision, laboratories included in the study were selected. They were sent a letter explaining the objective of the project as well as the instrument to be completed. Requested information is included in "Questionnaire for Laboratories that analyze POPs" of the "Evaluation of Existing and Necessary Capacities that Analyze POPs in Developing Countries" Project of the Chemical Products of PNUMA.

4.4.2 Results

Information received is from two private laboratories and three governmental universities research facilities. There was no ministry laboratories found that perform POPs analysis.⁴⁹ Received questionnaires are shown in appendix 3. Listed below are the obtained results from the POPs category.

General Aspects

- All laboratories consulted confirm that they have trained personnel to perform POPs pesticides analyses, including professionals in the area with Masters Degree, graduate, and lab technicians.
- Majority of clients are from private industries (approximately 80%) and only 20% are public.. In the case of research facilities, a percentage of the analyses performed are part of the research activities of the facility.

Sampling by Matrixes

⁴⁹ The National Laboratory of Veterinary Services of the MAG has performed PCBs analyses in animal fat. However, until the performance date of this report the corresponding information had not been given.

- All laboratories perform analyses of most POPs pesticides.
- Only three laboratories provide PCBs analysis service.
- Only two laboratories provide dioxins and furans analysis service.
- Main pesticide sampling matrices are effluent, food, water, land, and sediments.
- Most laboratories confirm that it is more frequent that the laboratory conducts the sampling; however, in some cases the client provides the sample.
- In the case of PCBs, the main matrix is transformer oil which simple is generally provided by clients.
- Dioxins and furans only reported matrix is chimney emissions in a very low amount.
- Only one laboratory reports to have analyzed samples taken by medical personnel or nursing in human blood.

Existence of Quality Assurance Programs

- All laboratories confirm to have an established quality control system and a person responsible of control and quality assurance (QA/QC),
- Four of the five of the laboratories consulted confirm to have a certified quality assurance program.

4.4.3 Comments and Conclusions

a. Related to pesticides:

There is a great amount of chemical laboratories in Costa Rica in public institutions like ministries, universities and research facilities as in the private sector. In many of these laboratories various types of pesticides analysis are provided to private industries and as part of the controls that by law some institutions have to perform on products imports, food residue control, and animal control among others.

However, within these analyses POPs pesticides are not included. It is reasonable to think that the lack of these analyses could be explained by the prohibition years ago of import and use of these compounds, according to the POPs Pesticides National Inventory elaborated in the activities framework of the Stockholm Agreement Implementation National Plan, the amount in the country of these pesticides is practically zero.

Many laboratories that analyze or have any relation to pesticides analysis were consulted. However, they only have a developed and implemented methodology providing the service those laboratories included in this study.

It is important to highlight that in a ministry level no laboratory perform this type of analysis that gives the idea that there is lack of governmental control of the subject. Some laboratories consulted, like in the case of the Pesticide Residue Laboratory of the Agricultural and Livestock Ministry, confirm to have personnel and equipment necessary resources to implement the POPs pesticides analysis methods what they need are the standards and analysis processing details. Other laboratories have a similar situation.

Another important aspect to pinpoint is the extraction and instrumental methods. There is no uniformity among the methods used. Extraction methods and/or instrumental methods are different from one another. This is directly reflected in the analysis procedures (the EPA, ASTM, AWWA methods among others).

Main matrices of pesticides sampling, in descending order, are:

- Water and effluents,
- food,
- soils and sediments,
- soiled residues

This gives the idea the historically controls have been addressed to water quality and the amount of residues in food. Land pollution also seems to be an important aspect analyzed.

b. Related to PCBs

PCBs situation is different. In total, five laboratories provide this analysis confirming an established analysis procedure and they are also many differences in the extraction and instrumental methods. Besides these five laboratories, only three laboratories have realized the test indicating that regardless of the demand experience in the analysis is lower. Analysis methods are also diversified and some have even been adapted by laboratories to their technical conditions and dispositions.

Analysis matrices are in majority transformers oils. Water, soils and sediments, solid residues analyses have also been performed giving the idea that environmental impact of PCBs use and emissions have not been done at least with experimental tests.

Only one laboratory has PCBs in soils and sediments (one of the matrices less used) credited analysis. Transformer oil sampling and analysis (biggest amount of analyzed samples) is not credited in any case. Additionally, no laboratory has participated in the PCBs analyses interlaboratory tests. Due to the necessity of analysis, especially in the Instituto Costarricense de Electricidad (ICE), they are currently working in the implementation of PCBs analysis tests and they are hoping that in the near future the service could be provided not only for the ICE but also to third parties.

c. Related to Dioxins and Furans:

The situation with dioxins and furans is the most critical one. Two laboratories provide the service with different extraction methods but with similar instrumental methods. However, only one of them has performed 8 tests, all of them in chimney emissions, and it is the only one that has it credited. There is no other type of analysis in other matrix. In this sense, analyst capacity is quite scarce.

Generally, it can be declared that PCBs analyses conducted in water, fish, marine mammals, human blood and breast milk are quite scarce. It can be concluded that impact controls and human health risk analyses related to POPs are scarce too.

An important aspect to pinpoint is the ambiguity in analysis methods. This is expected because there is no national regulation that establish analysis guidelines and accepted procedures as well as recognition and requirement of laboratories that provide the service (with the exception of two laboratories that have participated or are currently participating in a interlaboratory DDT test, the other have not participated in any). This is a nationwide necessity.

The lack of governmental analytical control is obvious. Ministerial analysis capacity especially in PCBs and dioxins and furans is null; therefore, related controls are not performed.

Finally, information spread is done only in those laboratories that are part of research facilities. The main objective of these facilities is research and extension, publication of documents reflecting conclusions of these studies including, in some cases, analysis results is inherent.

4.4.4 Recommendations

- To update the present study including the laboratory of LIMAT-ICE (it is currently in implementation process of the analysis method of the PCBs).
- To perform an study specifically in those laboratories that have an analytical capacity related to the analysis of POPs, that are not giving the service at the moment and are interested in implementing the tests. This could be one of the objectives of the NPA.
- To create a regulation for the analysis of POPs.
- To make up a nationwide analysis of POPs laboratory network. Among this network, interlaboratory tests could be conducted once the analysis methods are standardized by the regulation.

4.5 State of the Capacity and Legal Effectiveness⁵⁰ in relation to the POPs

In chapter 3, the state related to national and general legislation relevant to the POPs was presented, and, moreover, legal and regulatory weaknesses related to the management of POPs in compliance to the Stockholm Agreement were analyzed.

The main strengths and features to improve in relation to the capacity and legal effectiveness related to the POPs are summarized below.

4.5.1 Strengths:

- It exists, in the country, an environmental regulation that frames the management of chemical substances generally and partially the management of POPs.
- There are numerous laws and decrees regarding import, manufacturing, storage, transport, distribution, usage and operation, among these can be mentioned:
 - Approval of the Stockholm Agreement for Persistent Organic Pollutants Law No 8538 from 08/23/2006
 - Ratification of the Stockholm Agreement for Persistent Organic Pollutants, decree No 33438 from 11/6/2006
 - General Health Law No 5395 from 10/30/1973
 - Environmental Organic Law No 7554 from 10/04/1995
 - Phytosanitary Protection Law No 7664 from 04/08/1997

⁵⁰ Management of POPs Final Report. Chapter 4. Legal Instruments and non-regulatory mechanisms for the management of POPs.

- General regulation for the granting of Health Ministry sanitary permissions No 33240-S from 06/30/2006
- There are international commitments and national planning initiatives including environmental protection related aspects. All of this within an integrated environmental protection commitment framework indirectly including POPs management.

Pesticides:

Pesticides are the most regulated.

- Several decrees and regulations about import, registration, storage, production, transportation, marketing, usage and control, maximum limits, vegetables pesticides residues, tolerance, simple taking among others.
- Prohibition decree of registration, manufacturing, formulation, import, traffic, storage, sale and usage of: DDt, lindane, pentachlorophenol, hexachlorobenzene- p- dioxins, endrin, chlordane, heptachlor, dieldrin, aldrin, dechlorane, toxaphen, chlordcone, chlordimeform, dibromochloropropane, etildibromuro, dinoseb and nitrophen.
- Prohibition decree of manufacturing, import, traffic, sale and usage of organochlorinated insecticide.
- Prohibition decree of registration, import and usage of obsolete pesticides.
- Regulation about registration, usage and control of artificial formulated pesticides-
- Dangerous products: regulations about transportation, operation.
- Dangerous products: list, operation regulation.
- Regulations about immission, emission of dangerous pollutants

PCBs dioxins and furans

- In the case of PCBs, dioxins and furans there is a regulation for the import and usage prohibition in the country.
 - Decrees and regulation about prohibition, manufacturing, import, traffic, registration, marketing and usage of raw material or PCBs products (decree No 30050S).
- **Residues**
 - There exists in the Legislative Assembly a bill Project for the Integrated Management of Residues, at the beginning called Residues General Law, file No 15897. In the year 2008, the Costa Rican Solid Residues Plan PRESOL currently in implementation process was made official.

4.5.2 Improvements to make:

- It is necessary to establish a nationwide policy that includes integrated management of chemical substances for products as well as residues, POPs included.
- Economic incentive policy about recognition or any other for the appropriate chemical substances management in general and especially for POPs.
- Regulatory guidelines for the management and final disposal of POPs substances must be established since they do not exist.
- It is necessary to have guidelines and legal instruments related to

- a. POPs operation and final disposal. Although there are regulations for usage prohibition, there is anything specified about operation and final disposal of the products that already exist.
- b. For dioxins and furans, there is no regulation related to their management.
- A national policy for the integrated management of chemical products and their residues in the country is required. It must consider human resources, infrastructure, technical and economical in good environmental practices and international standards framework, considering the priorities and context of the country.
- A regulation referring occupational health related to PCBs, dioxins and furans operation is required, different situation from pesticides for which a recently created regulation exists.
- It is necessary for PCBs
 - a. To establish a regulation that first of all defines acceptable PCBs level in polluted products, even though the current value is 50 ppm a stricter regulation can be established.
 - b. This regulation should provide the guidelines for appropriate management of PCBs that exist in the country including occupational health, operation, registration, storage and appropriate final disposal.

4.6 State of Institutional Infrastructure Related to PCBs Management

In chapter 3, the state related to infrastructure related to POPs management.

Main strengths and aspects to improve related to the capacity and legal efficiency related to POPs are summarized below.

4.6.1 Strengths

- The Technical Coordination Department for the Rational Management of Chemical Substances was created with coordinating functions and to support the implementation and follow up of agreements and actions related to chemical substances management as detailed in Chapter 3 section 3.5.1.2

4.6.2 Improvement to make

It is necessary to strengthen:

- Capacities to watch and follow up safe dangerous chemical substances management in general and especially POPs
- Intersectorial coordination within the Technical Department especially the one related to POPs to strengthen nationwide interministry and regional coordination.
- Inspection and POPs management surveillance systems

- Evaluation and monitor program for the fulfillment of import, usage and production of regulated substances by the Stockholm Agreement prohibition as well as the establishment of technical notes in costumes to control illegal traffic and registration of substances.
- To establish an action plan to reduce or eliminate unintended POPs release in fixed sources that are intentional activities.
- ***For PCBs and dioxins and furans***, must be strengthen
 - a. Follow up and control of regulation fulfillment for the entire life cycle of dioxins and furans and PCBs.
- ***PCBs***
 - a. To expand and keep updated the inventory for other products containing PCBs
 - b. To strengthen analysis laboratories to reduce time and costs.
- ***Dioxins and furans***
 - a. To establish volunteer agreements with corresponding incentives with identified sectors as main dioxins and furans generators for gradual implementation of better available techniques and better environmental practices.
 - b. To establish policies and incentives to promote the use of the best technology available and better environmental practices.
 - c. To define indicators for every sector that permit to evaluate the efficiency of the implementation of best technologies available, better environmental practices and use of materials, processes and substitute products.
 - d. To revise, improve and approve a clear, systematic, traceable methodology for estimate and report of unintended POPs release that permit quantify (relatively) its increase or decrease in the source that adopts the best technology available or best environmental practices. If the art of measuring does not have the required precision and detection level to evaluate a significant reduction of COPNI release, the application of the best available technique is irrelevant.
 - e. To develop awareness and training in rural and marginal urban sectors related to the operation of domestic solid residues

4.7 State of POPs Information Systems including essential information for decision making and of easy access

4.7.1 Strengths:

- There exists a POPs database develop for including PCBs and POPs pesticides that is currently expanding to dioxins and furans.
- They are working in the development of a POPs information system with Access to POPs database of the MINAE as well as occupational health information, safety sheets and information about best technologies available and best environmental practices in POPs subject matter

4.7.2 Improvements to make.

It is necessary:

- To establish an information system about Chemical Substances Management in the MINAET with databases related to different institutions involve, to have reliable, appropriate and of easy access information for decision making.
- To define policies, mechanisms and responsibilities related to database feeding and information system management (methodology, safety policy) role and privileges of information accessing (what information will the public have access, and what entity defines if the information is provided or not). It must legally define how to oblige industries to provide the information.
- **PCBs**
 - a. To keep updated database with the information that industries provide as a result of their maintenance work, oil disposal analysis, and polluted equipments.
- **Dioxins y furans**
 - a. To establish databases, unintended dioxins and furans emissions and their sources by sector in the country statistics with supported information that might be incorporated in the existing POPs database.
 - b. To establish mechanisms that permit having a database and information about productive processes necessary for the use of the *toolkit* with emissions factors. This information should be sent by the industries and be centralized in the ministries as part of the exerting control processes information like the functioning permits. This will allow having more precise data for the II stage of the inventory.

4.8 State of Communication, awareness and citizenship participation

Ignorance about POPs subject matter, with the exception of POPs pesticides for which awareness actions and training have been developed, is generalized among several sectors. Chemical substances such as POPs chronic effects are not perceived as either risk of danger by part of the population. Which habits and every day activities might become a direct or indirect generator of POPs such as dioxins and furans are unknown.

Some nongovernmental organizations have worked in a more direct way in awareness and fight for their rights in pesticides subject matter. However, it is necessary to strengthen the chemical substances management approach, mainly POPs, considering the necessity of creating a dangerousness culture and management risk in the civilian society.

Regarding and as a part of this study a communication strategy was developed. Also, they elaborated a massive communication strategy with videos, tear-offs and tri-fold brochure, posters, radio ads among many more that were spread through television, radio and activities of the department and in special events as the world environment day. The idea is to continue with this communication strategy in the media to strengthen publix awareness about the subject matter.

It is important to take advantage of the educative potential of the different agents: academia, private initiative, civil organizations, and mass media, among others. This is why it is important to strengthen the support of certain agents involved in the subject matter so it reaches chemical substances management in a more deeply manner so all POPs are included in specific manner. For example, in the consultancies that the Chamber of Industry provides to their affiliates in subject matters like Management Systems, Environmental Auditing, Fulfillment Diagnosis with National Legislation, among others.

Likewise, in university programs for professional training in chemical substances management related areas, and, in particular, POPs, it is necessary to strengthen the development of courses or the inclusion of risk and dangerousness subject matter as well as toxicological studies incipient aspects in current curricula. In general generation of a risk and dangerousness assessment culture should be promoted. It should include **parauniversitaria** and technical education with emphasis in risk management and, explicitly, prevention permitting a more appropriate chemical substances management in general, and, in particular, POPs from home to the workplace.

The success of implementation actions to comply with the Stockholm Agreement depends in the possibility to make them concrete and specific actions that the different interest groups can promote from their action areas and competencies. Citizenship participation in the development and execution of the Implementation National Plan of the Stockholm Agreement constitutes fundamental aspects. This is explicitly in the of the Stockholm Agreement that in its 10th article establishes information, awareness and public training related criteria pointing out the responsibilities of every agent within its capacities will promote and facilitate. This aspect is also pointed out in 10th Principle of the Rio Declaration in which it is established that environmental problematic should be addressed from citizenship participation promotion and information Access.

4.9 Agent perception evaluation for the impact and health and environment risk in Costa Rica, the case of cane.

Related to the Stockholm Agreement that includes within its guidelines the elimination of dioxins and furans emissions and to identify the knowledge level and points of view of different agents involve in cane burning subject matter in the province of Guanacaste where cane crop is a big scale activity project "*Identification of key agents points of view for cane production persistent organic pollutants in the province of Guanacaste*⁵¹" was developed.

4.9.1 Methodology

The study was conducted in three stages. In the first stage, a list of key agents related to the subject matter was identified, an approach strategy was established and a series of initial contacts to evaluate the interest level of participation in the discussion of the subject matter in the consultancy were done.

In the second stage, a series of activities mention below were realized:

1. Conversation with different industries and organizations about the content of the interviews that will be performed, definition of dates and schedules for the realization of the interviews.
2. Conversation with persistent organic pollutants subject matter specialists to clarify and define some relevant topics to have in mind during the interviews.
3. Creation of a guide for data compilation for interviews with industries and civil organizations that permitted the creation of an appropriate systematization of different consulted aspects.
4. Visits to the three sugar industries in the province of Guanacaste: Ingenio Taboga, Ingenio CATSA and Azucarera El Viejo. Interviews with people in charge of environmental aspects of these industries and obtaining valuable information of their knowledge related to the Stockholm Agreement, of their production practices and challenges in environmental aspects to watch in sugar cane harvest processes.
5. Visits to Civil Organizations related to the environment problem in the region. In particular the Confraternidad Guanacasteca y el Foro Ecuménico de Desarrollo Alternativo de Guanacaste are quite active in environment protection and have been a key factor in the relation with the environment of different industries, including cane industries. The latter ones are most involve ones in constitutional rights protection actions. Also, it was discovered that the Coopeortega cooperative has pressed charges for cane crops burnings in the basin of the Tempisque River.
6. Processing of the information was consolidated and analyzed in order to prove essential subject matter aspects according to the perception of the agents.

The third stage consisted of the following activities.

1. Previously compiled information complement including interviews with agents not consulted in the previous stage: Agriculture Ministry, Health Ministry, employees of Conservation Areas of the MINAE where burning problem is presented.

⁵¹ Montero, D y Gaete, M. (2008) Montesol. S.A. Identification of key agents points of view for cane production persistent organic pollutants in the province of Guanacaste Final Report. DIGECA. MINAE.

2. Preparation and execution of an informative workshop about generation of propositions with agents involved in dioxins and furan emissions.
3. Creation of the memory of the event and final report of the consultancy.

4.9.2 Results

According to the report of the above mentioned Project, among the main results obtained are:

- Sugar mills are certified ISO 14000 and 9000. In total, they operate in a 14 000 hecs area producing sugar, alcohol and even electric energy. They harvest their own cane crops and they also receive cane from freelance producers that give them different volumes.
- Cane crop burning practice has become the center of the conflict between mills and freelance producers with neighboring communities and environmental organizations of the region.
- Even though the Costa Rican Government ratified the Stockholm Agreement for Persistent Organic Pollutants (POPs), and sugar cane burning practice is an activity that releases, unintended, dioxins and furans, stipulated in the agreement agents have information management of the subject matter either null or general.

Sugar mills sense that:

- They were not consulted and that they do have neither POPs subject matter nor the Agreement approach for their economic activity information management.
- They have started to work on “green” cane crops due to constitutional rights protection actions by the Confraternidad Guanacasteca,
- The environmental damage is evident; however, there are not big progresses in what green cane refers. This requires of incentives.
- The relationship between income and costs of introducing changes in the production systems for a more environmentally friendly.
- The relation with the MINAE is established for the implementation of voluntary agreements for a cleaner production.
- MAG is the institution in charge of giving burning permits and there is a regulation that must be followed.
- There is no knowledge of training for the Stockholm Agreement or related to dioxins and furans. There is, particularly, an interest in participating in training activities for these subject matters.
- Burnings affect the image of the industries and of the producers with their neighbors. It must be negotiation and conversation about it. There is a nice environment for it, before the changes are forced by law. A volunteer mechanism is appropriate.

Civil organizations sense that:

- Environment work and natural resources protection is a focal point of their actions. In cane crops burnings, the impact of the prohibition on the permanence of small producers worries.
- Only the Confraternidad Guanacasteca has knowledge related to POPs. Also, they have submitted constitutional rights protection actions; this is the way in which they are conceived, at least for now, environmental protection.
- By the time the technology is changed, the costs will increase but it is also admitted that they come from unregulated labor relationships in which contractors benefit.
- Complicity to violate the law between industries and employees of MINAE conservation areas is sensed. Furthermore, MAG that is in charge of burning permits does not control them appropriately

- It is imperative to eliminate cane crop burnings, but there is no certainty that industries are willing to do it. It is sensed that industries are not worry about their image and that they only care for business and the possibilities to do it.
- Dialogue is a tool to accomplish agreements. In order to be a part of the dialogue, it is required that the opinions of the sector represented are taken into consideration. If they are only for listening them, then the dialogue does not work.
- It is necessary to receive information and training in order to improve the discussion. However, industries must respect law. If they do not, they must be denounced to international law courts, in the framework of a discussion that includes the problem as a violation of human rights, etc.

As a summary, the report pinpoints:

"There is plenty to do in order to overcome economical and sociopolitical fears, from industrial and governmental agents as well as social ones. An appropriate road is the one of fair information and in fair spaces where there is not even a hint of partiality. After the information, training and negotiation for agreements that guarantee changes in favor of natural and human environment is necessary".

Governmental agents, Health Ministry employees, Ministry of Agriculture and Livestock and SINAC when consulted they said:

- According to the Constitutional Court resolution, Ministry of Agriculture and Livestock, MINAE through respective area of conservation and proper regional office of the Health Ministry are the ones responsible of giving cane crops burning permits.
- Currently, the Ministry of Agriculture and Livestock is the one in charge of providing to cane producers burning permits and of supervising the fulfillment of norms for the realization of the practice.
- Employees consulted do not know anything related to POPs emissions subject matter, dioxins and furans effects, as well as the incorporation of Costa Rica to the Stockholm Agreement.
- In the providence of Guanacaste, volunteer agreements for agricultural burnings (cane, pineapple, rice and fields) are been implementing through an interinstitutional commission with the participation of sugar engineers.
- It is necessary to provide information about the Stockholm Agreement and dioxins and furans effects to institutional employees as well as to the population of the areas where the agricultural burnings are performed.

Research i results were presented in a workshop organized by MINAE- DIGECA y Montesol Consultores S.A., it took place on March 2008 in the Earth facilities in Liberia, Guanacaste. Representatives of the different agents involved in the subject matter participated; the complete information about the workshop is in the Final Report cited⁵²

The objectives of the workshop were:

1. To know the contents and the scope of the signing, by the Costa Rican Government, of the Stockholm Agreement.

⁵² Montero, D y Gaete, M. (2008) Montesol. S.A. Identification of key agents points of view for cane production persistent organic pollutants in the province of Guanacaste Final Report. DIGECA. MINAE.

Montesol consultores. (2008)Workshop of involved agents in dioxins and furans in the province of Guanacaste Report. DIGECA. MINAE.

2. To locate the perspective and actions that different agents perform related to the POPs emissions problem, especially dioxins and furans.
3. To identify the challenges that Government and civil agents face in order to tackle dioxins and furans emissions problem in the region.
4. To define main work guidelines to approach the Stockholm Agreement commitments from the agreements of different agents in society.

According to the report, the activity fulfilled the objectives that oriented its creation and that can be summarized in the following results:

1. A dialogue space between the different social and economic agents about the environmental problem of the region and about the necessity of incorporating changes for social and human improvement was established.
2. People present, that are representatives of civil organization, were given information about the Stockholm Agreement and the Impact of dioxins and furans in the environment of every toxic persistent.
3. The necessity of promote research processes oriented to the identification of strategies and productive techniques that permit the substitution of burning in cane production was discussed.
4. The perception of different agents in the subject matter and their position related to the subject matter was recognized.
5. The follow up process of discussions was established and the incipient character of the results of this workshop in order to continue promoting the subject matter in a collective space was recognized.
6. The first step in order to know and volunteer agreements with all the agents with a position about it were set in practice, even with those that seem more flexible.
7. The necessity to multiply the workshop activities, that at the same time inform the points of view are been socialized, were established.
8. The necessity to produce more informative documents about the environment problem as POPs effects and productive activities created in a simple way for everyone to use was noticed.

In regards, the most important recommendations of the consulting team is to add to those that the participants already pointed out of keeping alive the dialogue process and information in a clear way with the purpose of creating successful negotiation models for what scientific and technical bases that found such agreements are accurate enough to transcend the particular, corporate, or personal interests in function of superior interest in human life and of all forms of life.

4.10 Socioeconomic Analysis of POPs management

As one of the tasks promoted by the Stockholm Agreement, a socioeconomic evaluation considering the PNUMA guideline in sectors and social groups that might be affected by the persistent organic compounds was designed and implemented.

The study⁵³ considered the recommendations of the guideline elaborated by the PNUMA, and incorporated some modifications because the guideline has methodologies to realize in group contexts, and the population in Costa Rica that might be affected by the actions of the Plan is spread and diverse.

Selection of involved agents was obtained from mentioned agents by the POPs inventories previously done in the country, although there were some problems in locating them, a total of 21 organizations, industries, universities, among others were located as well as the query of other agents in 2 participatory workshops.

In the evaluation, those considered direct interested are: government representatives, specifically of the MINAE, Health Ministry, sugar mills of the Grecia region, city leadership of the Grecia region, pineapple producing industries, city leadership of the Caribbean and Northern region, industries of the metallurgic sector, electricity generating industries, institutions and industries that had POPs pesticides and expired bottles.

4.10.1 Methodology

The methodology used to perform the research was based in three information sources⁵⁴:

- a. Document Query: the query process was done through internet bibliographic revision, specialized books, done researches, dioxins and furans inventories, POPs pesticides and PCBs, Implementation National Plan actions of mentioned substances. The query process not only permitted to explain POPs impacts but also to organize the conceptual platform for the construction of the variables in the application instruments of the socioeconomic evaluation.
- b. Instrument application: Socioeconomic evaluation instrument design was done consistently according to the objectives defined for the investigation. Closed questionnaires, semi structured interviews and an observation guideline were combined that allowed to establish comparisons between POPs impacts (see in attachment 1 the instruments used). Different instruments to measure the impact of every group of persistent organic compounds were designed.
- c. Participatory Workshop: The third source of information was the elaboration of two participatory workshops, the first one with employees of institutions and private industries of the GAM related to PCBs, dioxins and furans and pesticides. The second workshop took place with city leaders of Grecia, a city characterized for been a canton with cane industries that develop combustion processes for cane production and industries with no burning environmental certifications (ISO 14000). Both workshops had as main objective to perform a socioeconomic evaluation of the impact of priority actions in the Implementation National Plan for POPs.

⁵³ Arroyo, H. Marín, M, Solé, E. y Lobo, S. (2008) Design and Implementation of Socioeconomic Evaluation of POPs Management.Final Report. MINAE, DIGECA, ACEPESA.

⁵⁴ Idem Arroyo, Marín.....

4.10.1.1 Sample Selection

The study included interviews all over the country. However, sample selection, was made from identified focalizations in dioxins and furans, POPs pesticides and PCBs inventories elaborated in 2007.

As sample framework the total number of industries, institutions, cooperatives, academic facilities and communities in different regions of the country mentioned in the POPs, dioxins and furans and PCBs inventories provided by the Management on Environmental Quality Department of the MINAE (DICECA)

For industries, institutions, cooperatives, academic facilities and communities selection, the technical recommendations by the DICECA employees Rosario Zúñiga, Anna Ortiz y Pilar Alfaro were taken in consideration, as well as the recommendations given by Dennis Montero, Montesol consultant. Later in the execution process of the evaluation, the initial sample of dioxins and furans is evaluated again including populations related to the pineapple industry, metal mechanic sector and industries that execute combustion processes as part of their productive processes.

In the case of pineapple, the gathering of information was through questionnaires and semi structured interviews, while the sector related to metal mechanic industry, industries or institutions that execute combustion processes were evaluated through a participatory workshop.

On the other hand, the technical team in charge of ACEPESA realized an exhaustive analysis POPs inventories intending to select geographic regions, substances type and characteristics of the nearby population to the industries and cooperatives among others.

In the final report presented in the attachment No... is the description of the institutions, industries, and sample agents for different sectors as well as every detail of the investigation.

4.10.2 Results:

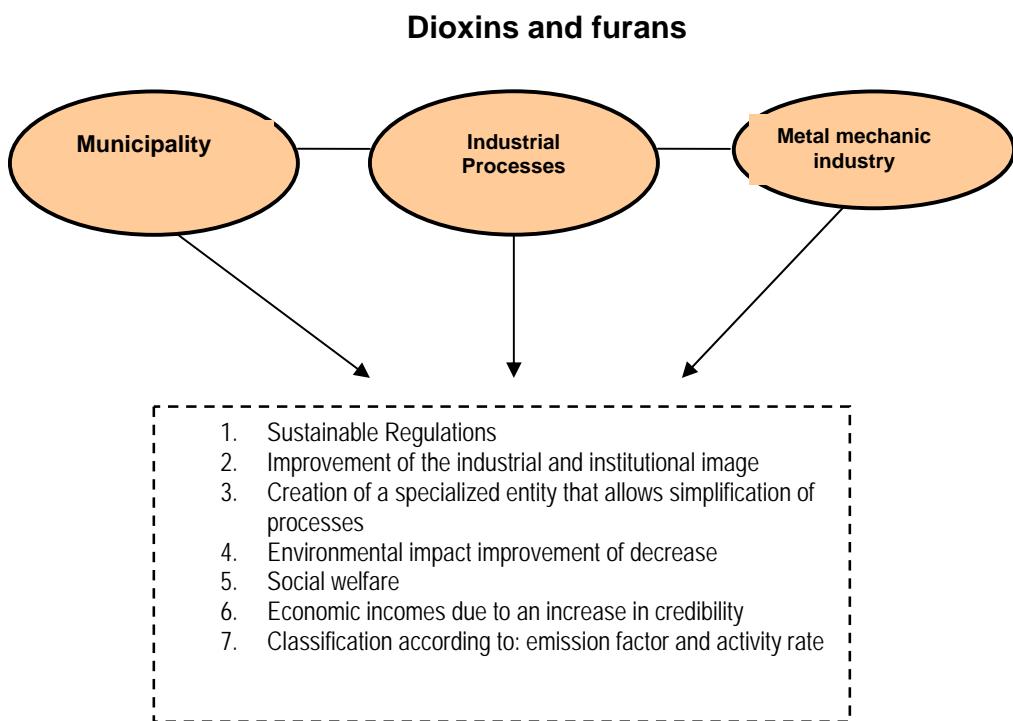
The result of the analysis obtained is presented in the query process of the organizations agents as governmental, industries, universities, cooperatives and communal leaders through instruments as interviews as well as in the workshops performed.

4.10.2.1. Dioxins y Furans

a. Dioxins and furans agents interests analysis

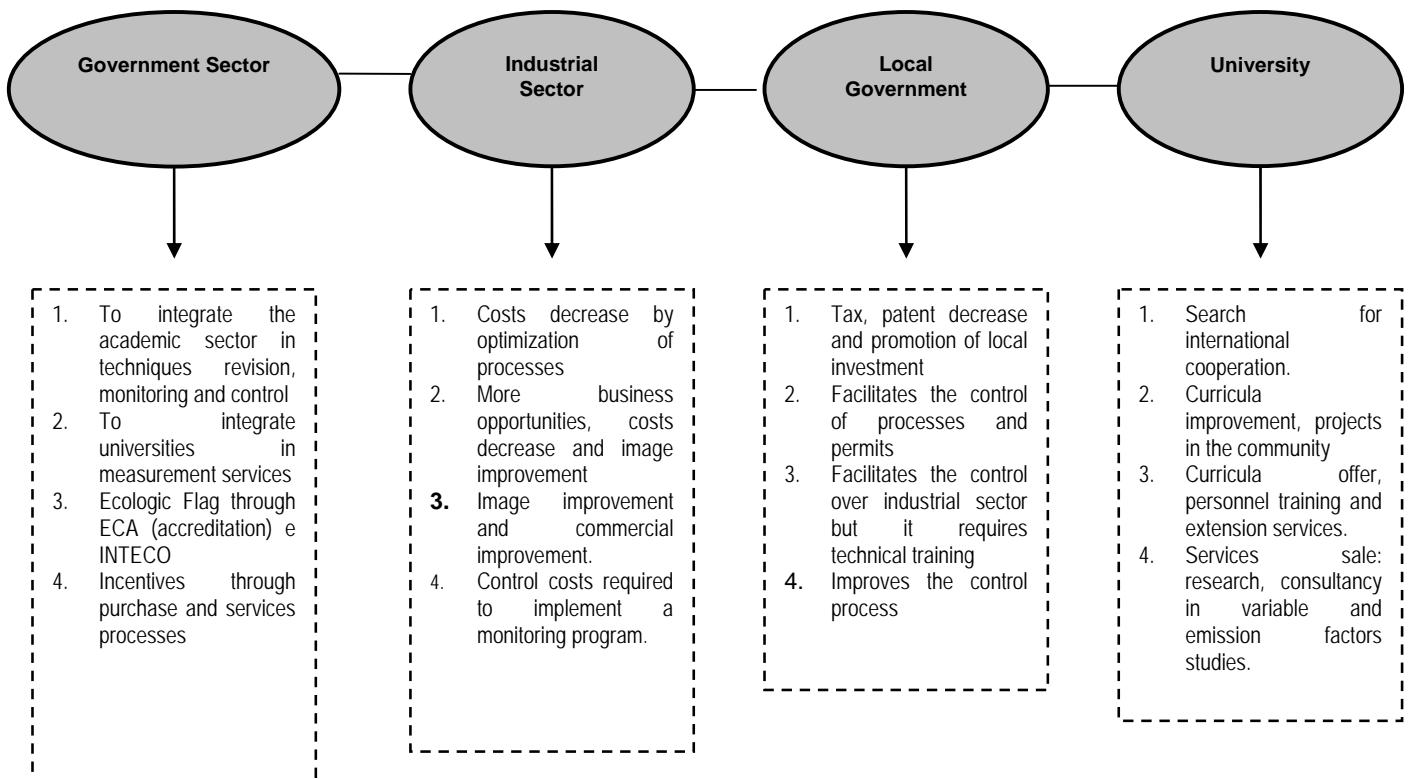
The interests of the agents related to dioxins and furans are quite diverse since they consider several sectors involved. The work done as an input for this section was realized in two groups consequently each group presents different results.

In the case of group 1, sectors define are grouped into local government, industrial processes, and metal mechanic industry. For every one of these agents, the same interests related to the implementation of the actions of the Plan are identified.



Source: Own creation based on the results of the first workshop.
Socioeconomic Evaluation Final Report

Figure 8 Dioxins and Furans Agents Interests Group 1 in NIP actions



Source: Own creation based on the results of the first workshop. Socioeconomic Evaluation Final Report

Figure 9. Dioxins and Furans Agents Interests Group 2 in NIP actions

b. . Benefit cost for dioxins and furans agents of action implementation

Benefits related to action implementation by sector:

- 1. Local government:**
 - Environmental protection
 - Healthy environment and environmental sustainability
 - Public health
 - Municipalities image improvement
 - Mobilization for the organization

- Informed community
- Income increase or costs decrease
- New business opportunities
- Internal improvement of proceedings for emission control
- Technology improvement

2. *Government sector:*

Benefits for the government sector related to the implementation of the actions are high because it is identified as the sector that can get more technical, political and economic benefits in the execution of the actions of the Plan. These benefits are related to:

- Credibility in its management
- Public health improvement
- Job increase
- Higher process control
- Personnel training
- International image
- Higher involvement and more participation of the sector
- Incentive plan by goods and services purchase
- Higher productivity

3. *Industrial sector:*

Industrial sector cost-benefit valuations summarize analyses done on the agro industrial sector and on the metal mechanic industry. Benefits that can be obtained from the implementation of the actions are the following:

- Damage decrease and environmental control
- Image and credibility
- Legal requirements fulfillment
- Suppliers development
- Increase in sales by accreditation (credibility).
- Higher business opportunities
- Better working conditions
- Trained personnel
- To make things easier with public entities
- Feedback and continuous improvement
- Internal improvement of proceedings for emission control

Table 36 Technical, economic, political and social costs associated with the implementation of all the actions, by sector

Social	Technical	Political	Economic
Local government sector			
<ul style="list-style-type: none"> • Cultural impact requires time and training • Resistance to changes • Organization of the community • Change of habits, attitudes and life style 	<ul style="list-style-type: none"> • High cost in training and communication of the project as well as in infrastructure. • Technical assistance and methodologies 	<ul style="list-style-type: none"> • Low budget • Implementation of laws, programs • Impact on a important sector of national economy 	<ul style="list-style-type: none"> • Technology with a high acquisition cost • Costs of infrastructure, personnel and training • Plan of incentives through the purchase of goods and services • Divulgation campaigns. • Training
Governmental sector			
not applies	<ul style="list-style-type: none"> • Implementation of rules, laws, programs • Training and hiring • Technical assistance to implement the methodologies. 	<ul style="list-style-type: none"> • Impact on an important sector of national economy 	<ul style="list-style-type: none"> • Implementation, development of programs and policies • Plan of incentives through the purchase of goods and services • Divulgation campaigns • Training • Production and optimization of the processes
Industrial sector			
<ul style="list-style-type: none"> • Change in culture and in operative profile of the personnel • Possible personnel reduction • Increase of unemployment. • Change in organizational culture 	<ul style="list-style-type: none"> • Change in technology or transference • Training and hiring • Technical assistance in personnel training. • Technological changes • Development of services and suppliers • Equipment required for the system certification 	<ul style="list-style-type: none"> • competitiveness loss • Cost of time necessary to define them • Creation of a certifying entity 	<ul style="list-style-type: none"> • Cost of certification and maintenance • Hiring of audits and trainings • Initial costs for the purchase of equipments • Development of norms for certification

c. Impact evaluation

Though the representatives of the different sectors, sugarcane, pineapple, that were interviewed have no knowledge about the concepts of dioxins and furans, they do have a clear understanding of the impact of emissions and ashes on the environment.

The introduction of better practices result in better products of the companies, but it implies costs. The implementation of environmental management methods signifies a change in cultivating uses, a change in the managerial attitude, a change in producers and workers in the companies, cooperative, the adoption of new technologies in the immediate time, investment in working equipment, land, hiring of more labor. On the other hand, the incorporation of environmental management methods into the community will offer a better quality of living for people, higher demand of labor, a harmonious relation between sectors (decrease in legal demands) and a better environment.

The following Table summarizes costs as seen by each sector in implementing environmental management methods

Table 37 Costs as seen by every sector at the moment of the implementation of new methods for environmental management of dioxins and furans

Sugar cane plantations	Pineapple plantations	Society	Ministries	Other enterprises
<ul style="list-style-type: none"> • Increase in the cost of hiring employees • Increase in social obligations • Increase in the cost of migratory procedures • Cultural impact • Impact on public services • High cost for technological investment and specialized equipment. 	<ul style="list-style-type: none"> • Increase in the cost of hiring employees • Purchase of machines • Purchase of land • Purchase of special equipment for the creation of channels to bury the pineapple plant 	<p>About sugar cane plantations:</p> <ul style="list-style-type: none"> • Acquisition of new techniques or technology • Acquisition of equipment • Larger amount of labor force • Impact on public services in the community (schools, medical centers, etc.); due to the need of external labor force. <p>About pineapple plantations:</p> <ul style="list-style-type: none"> • Increased hiring of personnel • Specialized equipment • Changes in cultivation 	<ul style="list-style-type: none"> • Specialized human resource • Trained personnel • Administrative orientation • Specific rules 	<ul style="list-style-type: none"> • Official policies to encourage the implementation • Training • Cultural change • An entity in charge of monitoring and improvements • Costs of environmental monitoring • Costs of sample analysis to detect dioxins and furans emissions • Costs for technological change

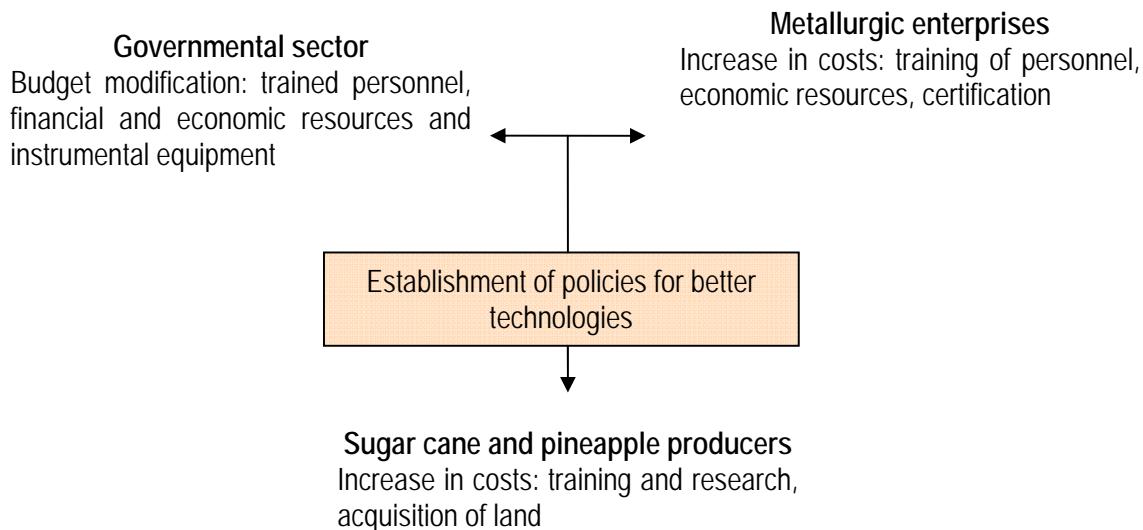
		<ul style="list-style-type: none"> • Changes in organizational culture • Incorporation of technologies • Purchase of land • Increase in research 		
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d. Establishment of policies to encourage the use of better available technology and environmental practices.

The main requisite to create measures tending to encourage the use of better available technology and environmental practices is the training in feasible and sustained technologies as well as external support to implement them. It is equally important to research for other alternatives and to have the support of related institutions.

In order to implement monitoring programs it is necessary to have: personnel, vehicles, specialized equipment and rewards

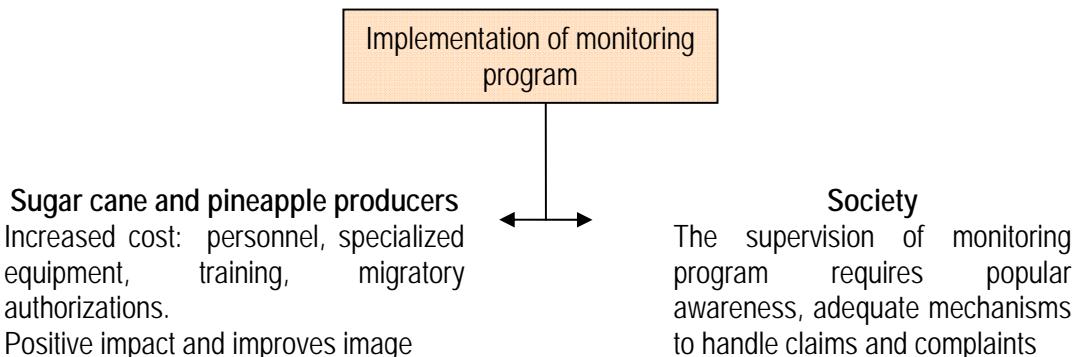
Diagram 2. Summary of impacts mentioned by interviewed agents



Source: Final report about Social-economic evaluation of COP's

Diagram 3 summarizes impact on actors due to the implementation of a monitoring program

Diagram 3. Summary of impacts mentioned by interviewed agents



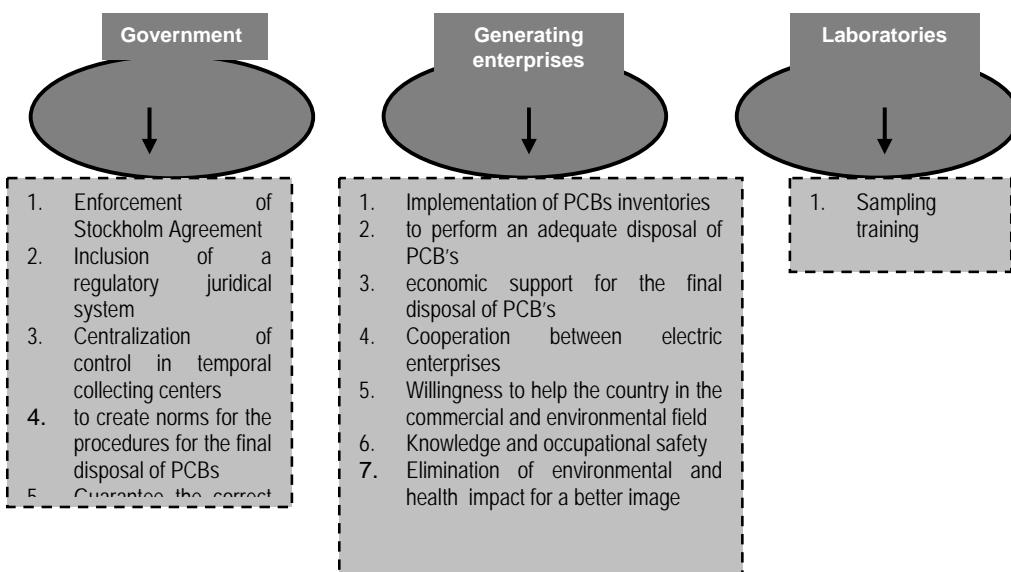
Source: Final report about Social-economic evaluation of COP's

4.10.2.2 PCB's

a. Analysis of the interests of the different PCBs actors

The analysis of direct actors bound to PCB's starts with the perception of those representatives from the different electric enterprises that participated in the institutional workshop

Different sectors are grouped as follows: governmental sector, public/private enterprises generating electricity and national laboratories. The interests of each sector, associated to the implementation of the Plan's actions are defined as shown in Graphic 3:



Source: Own elaboration according to the results of the first workshop. Final report, Social-economic evaluation of COP's management.

Figure 10. Interests of actors in the actions of PIN

b. Cost- benefit for PCB´s actors derived from the implementation of the actions
 Benefits as seen by the actors, according to workshop.

Government sector

- Better quality of life for the population
- Occupational safety
- Good national and international image
- Trained personnel
- Acquisition of new technology
- External financing for the control of emissions

Enterprises generating electricity

- Better quality of life
- Minimization of environmental impact
- Exposure of workers without risk
- Highly trained personnel
- Equipments free from PCB's
- International cooperation for the implementation
- Comply with international agreements

National laboratories (responsible for the analysis of the samples from generating enterprises)

- Quality in the results,
- Economic benefits,
- Trained personnel
- High technology equipments.

Table 38. Required costs for the implementation of the actions of environmental management of PCB's

Social	Technical	Political	Economic
Government sector			
1. Impact on the community for the existence of a collecting site 2. Publicity	1. Trained human resource 2. Training activities 3. Divulgation and supervision activities 4. Costs of technical and safety maintenance	1. Image cost for not complying with agreements	1. Costs of the implementation of regulation and supervision policies 2. Investment in infrastructure and land preparation. 3. Investment in positions for the execution
Enterprises generating electricity			
1. final costs are charged to the final consumer. 2. Image and social impact 3. Public health	1. Trained human resource 2. Training and divulging activities 3. Moving of equipments and substitution of equipment with	1. Cost of image for not complying with the Agreements	1. Investment in training 2. Implementation and final disposal. 3. Investment in equipment and inventories 4. Cost of analysis and

	specialized equipments.		implementation
Laboratories			
	1.Trained human resource 2.Training activities		1. Investment in special equipments 2. Investment in personnel training

c. Development of PCB's managing plans and final disposal of equipments

The development of managing plans for the PCB's, including the use of protocols and registration procedures, maintenance, follow-up, final disposal and the incorporation into an information system will guarantee the adequate use of equipments and the reduction of effects on the society.

For the development of managing plans the different institutions and cooperatives need to train people but also adequate infrastructure, informatics and technical support. All these requirements could have an impact on the costs structure of the institutions and it may be reflected as an increase in the prices of electricity for the final consumers.

The development and implementation of managing plans for the final disposal of equipments with PCBs requires certain conditions. These requirements represent high economic costs that would be reflected in the cost structure of the different institutions and therefore in an increase in the price of electricity to consumers. The following is a description of the requirements:

Cooperatives

- Land purchase
- Materials and workers for the construction
- Equipment
- Personnel
- Informative campaign for population
- Remodeling of the warehouses
- Building of warehouse (approximate cost 20 million of colones)

Institutions

- Preparation of the land
- Moving of equipments
- Infrastructure and conditioning
- Maintenance and safety of human resource
- Administrative procedures
- Legal framework (not existing) for the establishment of guidelines and minimum safety measures for this type of center.
- Material for the impermeabilization of soil
- Financing for the analysis with gas chromatography
- Equipments (for manipulation, management and taking of samples, test kits and laboratory analysis, equipment for the collection of leakages and personal safety)

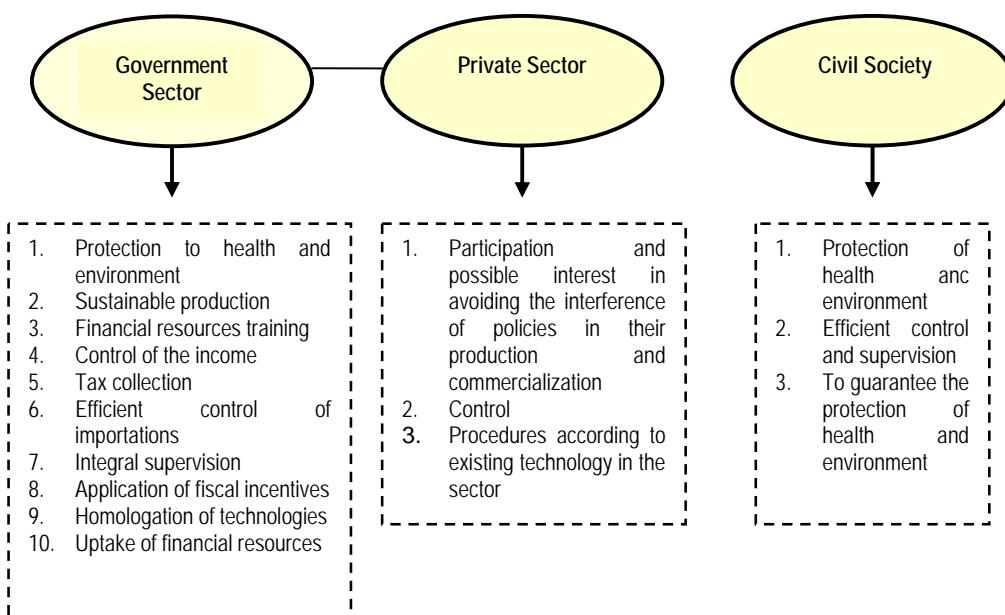
d. Development of criteria for the selection of methodology for PCBs polluted sites

Among the most important requirements for the development of methodologies are the existence of adequate laws to regulate the different actions; technical studies, personnel training and special equipment. Among the requirements that were specified by the different enterprises and institutions in the development of methodologies are:

4.10.2.3 COP´s pesticides

a. Analysis of the interests of the actors

The actors that participated in the institutional workshop pointed out three important sectors according to importance and influence in the determination of the actors' interests: government, private sector and civil society. These interests, associated to the implementation of the Plan actions are defined as shown in graphic 4:



Source: Final report about the Social economic evaluation of the COP's

Figure 11. Interests of actors in the actions stated in the PNI for COPs pesticides

b. Cost- benefit of the implementation of actions

Benefits

Government sector

- Installed capacity and guidance in the definition of own actions
- International positioning as referent in the field of health and environment
- Possible uptake of resources
- Decrease in the expenses by the remediation of polluted sites

Civil society

- Participation of citizens
- Limitation to the entrance of polluted products
- Reduction of contamination
- Sites available for other activities
- Advise in the government's actions
- Investment of resources in other fields

Private sector

- Higher commercial competence and higher income.

Table 39. Analysis of cost-benefit ratio in the management of pesticides

Social	Technical	Political	Economic
Government sector			
1. Could affect certain activities of the sector such as the access to work sources. 2. Search for substitutive products 3. Spreading of the information and guidance to social groups.	1. Trained personnel in control and supervision 2. Research for the development of methodologies and procedures	1. Possible effect on competence	1. Budget preparation 2. Costs of research, training and spreading of information 3. Costs of substitutive products with higher cost.
Private sector			
	Technical changes because of substitutive products		Economic investment

b. Policies and sector plans for the management of expired pesticides and packages

Requirements for the actors engaged in the management and final disposal of COPs pesticides.

For the definition of policies it is necessary to have a formative process and the awareness of civil society and the different companies about the impact of pesticides.

Besides, it is necessary to implement a series of conditions in order to guarantee the establishment of temporal collecting infrastructure and the management of pesticides. These requirements are specified:

In relation to management

1. The Ministry of Health requires human, economic and material resources.
2. MINAE considers that it has no competence in the field (MAG and Health), but it also requires more personnel, and specific laws for these types of emissions as well as political will,
3. Ministry of the Treasury requires special personnel such as planners and administrators who may guide the technical personnel.

In relation to final disposal

1. Financial resources for infrastructure and maintenance
2. Personnel trained in supervision
3. Rules and laws
4. Space
5. Technological resources according to the desired disposal.

V. Actions Plans

The main objective of the Implementations Plan:

To protect human health and the environment of Persistent Organic Pollutants in Costa Rica in the framework of the Stockholm Agreement implementation by

- a. PCBs pollution control,
- b. Reduction and control of dioxins and furans emissions in Costa Rica
- c. POPs pesticides elimination

The Costa Rican implementation plan for the compliance of the Stockholm Agreement is organized in 6 actions plans created based on the inventories done, analyzed and enriched in workshops with experts:

- Legal Strengthening
- Institutional Strengthening
- PCBs pollution control
- POPs pesticides elimination
- Reduction and control of dioxins and furans
- Citizen awareness, communication and participation

The actions plans are included below.

Legal Strengthening Logical Framework

	Indicators	Verification	Assumptions
1. Goal			
To decrease environmental pollution and health problems derived from stocks and generation of POPs.	<ul style="list-style-type: none"> • Fewer impact levels on health and the environment by the reduction of POPs pollution in air, water and soil. 	<ul style="list-style-type: none"> • Legal framework that takes into consideration the integral management of chemical substances in all their lifecycle. 	<ul style="list-style-type: none"> • Knowledge of health and environmental problems. • Informed parties about environmental commitments. • Informed politicians about POPs management problem.
2. Objectives			
To contribute with NIP implementation to eliminate and/or reduce POPs in Costa Rica.	<ul style="list-style-type: none"> • Decrees and regulations incorporating chemical substances management elements from a lifecycle approach. 	<ul style="list-style-type: none"> • Decrees and regulations for chemical substances management with approved, divulged and implemented lifecycle approach. 	<ul style="list-style-type: none"> • Informed parties about environmental commitments. • Informed politicians and employees about POPs management problem.
3. Outputs			
1. To establish a national policy, led by MINAET in coordination with Health Ministry, for the integral management of chemical substances and their residues in the country.	<ul style="list-style-type: none"> • National policy created for the integral management of chemical products and their residues established in the country. 	<ul style="list-style-type: none"> • Document with the approved and published policy. 	<ul style="list-style-type: none"> • Knowledge of health and environmental problems. • Informed parties about environmental commitments. • Informed politicians about POPs management problem.
2. To create legal instruments related to the management of existing POPs and generated residues.	<ul style="list-style-type: none"> • Created and published laws, regulations, decrees as well as other legal instruments related to the lifecycle management and final disposal of POPs. • Application of technical notes in the import process to prevent possible POPs. 	<ul style="list-style-type: none"> • Created and published document with the approved and divulged norm about the management with a lifecycle and final disposal approach. 	<ul style="list-style-type: none"> • Knowledge of health and environmental problems. • Informed parties about environmental commitments. • Informed politicians about POPs management problem.

	Indicators	Verification	Assumptions
3. To establish an economic instruments and incentives policy of recognition or other for the adequate management of chemical substances in general and especially POPs.	<ul style="list-style-type: none"> Created and published economic instruments and incentives related to the management with a lifecycle and final disposal approach. 	<ul style="list-style-type: none"> Created and published document with economic instruments and incentives about management with lifecycle and final disposal approach. 	<ul style="list-style-type: none"> Knowledge of health and environmental problems. Informed parties about environmental commitments. Informed politicians about POPs management problem.
4. Activities			
1.1 To diagnose human, infrastructure, technical and economic resources in the country for the application of the policy.	<ul style="list-style-type: none"> Interdisciplinary and interinstitutional team with an established coordinator. 	<ul style="list-style-type: none"> Records and agreements of the interdisciplinary and interinstitutional team. 	<ul style="list-style-type: none"> An adequate management of chemical substances and their residues is accomplished by means of a interdisciplinary and interinstitutional team.
1.2 To establish, as a country, priorities for the application of a national policy for the integral management of chemical products and their residues.	<ul style="list-style-type: none"> An organized forum by the interdisciplinary and interinstitutional team in which experts in the subject matter of every institution involved participate. 	<ul style="list-style-type: none"> Report of the forum. 	<ul style="list-style-type: none"> A policy for the management of chemical substances and their residues according to the priorities of the country is established.
1.3 To define a policy that includes good environmental practices, international standards and SAICM guidelines.	<ul style="list-style-type: none"> Priorities for the application of a national policy for the integral management of chemical products and their residues. Final document considering good environmental practices, international standards according to SAICM guidelines. 	<ul style="list-style-type: none"> Final document with results from the forum. 	<ul style="list-style-type: none"> The policy complies with good environmental practices and international standards.
2.1 To make up a committee for the creation of legal instruments.	<ul style="list-style-type: none"> Interdisciplinary and interinstitutional team in charge of the creation of legal instruments. 	<ul style="list-style-type: none"> Records and agreements of the interdisciplinary and interinstitutional team 	<ul style="list-style-type: none"> The interdisciplinary and interinstitutional team establishes a legal instrument for POPs final disposal control

	Indicators	Verification	Assumptions
2.2 Revise, update, and propose applicable legal instruments.	<ul style="list-style-type: none"> Updated harmonized legal instruments considering the policy and established priorities for the country. 	<ul style="list-style-type: none"> Applicability of the instrument to the reality of the country. 	<ul style="list-style-type: none"> applicable to the national reality. An adequate POPs management is accomplished by means of a legal instrument.
3.1 To define the objective of economic instruments. 3.2 To establish a economic instruments and incentives policy. 3.3 To establish economic instruments. 3.4 To divulge and train the users of chemical substances and POPs in the usage of economic instruments and incentives.	<ul style="list-style-type: none"> Validated, approved and divulged policy. Approved and published economic instruments and incentives. Informed users about the policy and economic instruments and incentives. 	<ul style="list-style-type: none"> Document containing the validated and divulged policy. Documents containing the approved and published economic instruments and incentives. Material for the awareness and disclosure of the policy and economic instruments and incentives to users. 	<ul style="list-style-type: none"> The policy complies with good environmental practices and international standards. To incorporate the operationalization of the economic instruments and incentives policy for POPs management into the national budget.

Institutional Strengthening Logical Framework

	Indicators	Verification	Assumptions
1. Goal			
To decrease environmental pollution and health problems derived from stocks and generation of POPs.	<ul style="list-style-type: none"> • Fewer impact levels on health and the environment by the reduction of POPs pollution in air, water and soil. 	<ul style="list-style-type: none"> • Section of DIGECA, MNAET that follow up, monitor and control the activities of the NIP. • Department of chemical substances in full action complying with the objectives and work plans. 	<ul style="list-style-type: none"> • Awareness of the ministries related to the importance of interinstitutional coordination for the management of chemical substances. • Available economic resources in the POA of the institutions.
2. Objectives			
To contribute with NIP implementation to eliminate and/or reduce POPs in Costa Rica.	<ul style="list-style-type: none"> • Aware section coordinating for the integral management of chemical substances and POPs reduction with a lifecycle approach. 	<ul style="list-style-type: none"> • Department of chemical substances in full action complying with the objectives and work plans. • Institutions related to the management of chemical substances that actively participate in the department of chemical substances and implementing its agreements. 	<ul style="list-style-type: none"> • The National Development Plan includes defined priorities related to NIP in the chemical substances management framework. • Operative plans of institutions related to the management of chemical substances that have defined priorities and assigned resources to comply with the actions.
3. Outputs			
2. To strengthen, within the Technical Department, intersector coordination in terms of an integral management of chemical	<ul style="list-style-type: none"> • Three intersector committees managing POPs problem. • Participation of a MIDEPLAN representative in 	<ul style="list-style-type: none"> • Records of committee's nomination. • Committees' work plan Reports of actions done by work committees. 	<ul style="list-style-type: none"> • Ratified Stockholm Agreement. • Interest from the ministers in supporting with actions the work of the department.

	Indicators	Verification	Assumptions
substances with a lifecycle approach.	<p>the chemical substances department.</p> <ul style="list-style-type: none"> • Campaigns about the department, its functions and its importance in the coordination of POPs integral management. • Actions to motivate the participation of institutions in coordinated actions. • Cases in which coordinated actions have taken place, in a interinstitutional way, in POPs management. 	<ul style="list-style-type: none"> • Informative material about the campaign. • Documented cases of coordinated POPs management. 	<ul style="list-style-type: none"> • The objectives of the National Implementation Plan are reflected in the POA's strategic guidelines of the institutions involved in the chemical substances subject matter. • Validated National Implementation Plan by all sectors involved. • Involved sectors are interested in participating along with the Technical department.
4. Strengthen the abilities to control and follow up the safe operation of dangerous chemical substances.	<ul style="list-style-type: none"> • Training actions for the integral management of POPs with a lifecycle approach. • Approved and included coordination procedures and mechanisms of POPs management into the POAs of the institutions for the control of chemical substances management. 	<ul style="list-style-type: none"> • Training courses with a list of the participants. • Document containing the approved coordination procedures and mechanisms. • POAs of the institutions with actions to implement, in an intersector way, an integral and coordinated management of chemical products. 	<ul style="list-style-type: none"> • Interest of bosses and employees in the creation and strengthening of abilities for the integral management of chemical products in a coordinated manner. • National Implementation Plan is validated by all sectors involved. • The sectors involved are interested in participating along with the Department.
3. To establish a national information system that allows: -update of the inventories by statements of the generators	<ul style="list-style-type: none"> • Updated and functioning POPs database. • Six-month statement about usage and final disposal of 	<ul style="list-style-type: none"> • Updated and functioning POPs information system in internet. • Reports generated about 	<ul style="list-style-type: none"> • Available necessary resources for updating the database.

	Indicators	Verification	Assumptions
- access to BAT and BET information, inventories and localization of POPs stocks. – creation of reports for the analysis, control, monitoring of reduction of stock and management of chemical substances in general.	<p>chemical substances.</p> <ul style="list-style-type: none"> • POPs information system in internet. 	stocks and elimination of POPs for monitoring, control and report to the Stockholm Secretariat.	
4. Activities			
1.1 Conformation of intersector committees managing POPs problem. 1.2 Development of coordinated projects for POPs management.	<ul style="list-style-type: none"> • Three intersector committees functioning within priority areas. • Ten intersector projects in the priority areas (PCBs, dioxins and furans and pesticides). 	<ul style="list-style-type: none"> • Records and agreements of intersector committees for POPs management. • Approval of intersector projects for POPs management. • Advancement reports of intersector projects for POPs management. 	<ul style="list-style-type: none"> • National Implementation Plan validated by all sectors involved • The sectors involved are interested in participating along with the Department. • There is an adequate finance source for every project.
2.1 Develop policies, procedures and protocols for the control of dangerous chemical substances and consultation with interested sectors. 2.2. To establish training programs for operation of chemical substances auditors. 2.3 To incorporate operation of	<ul style="list-style-type: none"> • Operation of dangerous chemical substances auditor teams properly made up. • Issued developed and approved policies for the control of dangerous chemical substances. • Assigned economic and 	<ul style="list-style-type: none"> • Policy, procedures, and protocols for the control of dangerous chemical substances validation document. • Teams conformation report. • Lists and reports of auditor 	<ul style="list-style-type: none"> • As a priority of the National Develop Plan, dangerous chemical substances are defined. • There is legitimacy for the control of chemical substances operation from the sectors involved. • There are human and economic resources for the

	Indicators	Verification	Assumptions
dangerous chemical substances auditor teams within the organization of institutions (POAs) and private.	human resources in the POAs of the institutions involved.	teams.	<p>formation of auditor groups.</p> <ul style="list-style-type: none"> • Within the national budget, there are entries included for human and economic resources to strengthen the control of dangerous chemical substances operation.
3.1 To design an information system for the management of POPs that allows: 3.2 To create and update POPs databases. 3.3 To establish policies, norms and procedures to access and update the information. 3.4 To establish administration policies and procedures about the generation of reports and analytical reports that permits to make the right decision about POPs management. 3.5 To develop a training program with generator entities providing information. 3.6 To develop a training program for users of the system.	<ul style="list-style-type: none"> • Designed and implemented information system. • Updated databases. • Established policies and procedures for: <ul style="list-style-type: none"> - information analysis as part of decision-making. - import, usage and final disposal of chemical substances information update. • Documented and updated POPs stocks. 	<ul style="list-style-type: none"> • Information system with internet access. • Georeferenced POPs maps. 	<ul style="list-style-type: none"> • International funds for the design, implementation and training on the information system.

PCBs Action Plan Logical Framework

Objectives	Indicators	Verification	Assumptions
1. Goal			
To prevent and decrease environmental pollution and health problems caused by electric and oil equipments containing PCBs in the country.	<ul style="list-style-type: none"> PCBs-free industries of electric, public and private sector. 	<ul style="list-style-type: none"> Integral management system of equipments and oils in the electric industry. Analysis of PCBs pollution -free land and water. 	<ul style="list-style-type: none"> Knowledge of health and environmental problems related to PCBs. Electric industries take responsibility for integral management of equipments and oils polluted with PCBs.
2. Objectives			
To control PCBs pollution in Costa Rica.	<ul style="list-style-type: none"> 5 years from now, a 50% reduction of identified PCBs equipments in the country. By 2018, a 80% reduction of identified PCBs equipments. 	<ul style="list-style-type: none"> Stock list of PCBs equipments in operation, and traceability of equipments polluted with oils. Stock list of stored PCBs. Equipment dispatch record for final treatment. 	<ul style="list-style-type: none"> Ratified Stockholm Agreement. Industries willing to participate in PCBs elimination and in a temporary stocking center. Budgets with available funds in industries for the transformers and oils elimination.
3. Outputs			
Short term 1-5 years			
1. To develop and update the legislation with clear norms to conduct an adequate PCBs management and related	<ul style="list-style-type: none"> To develop and approve an adequate legislation in a 1.5 years period. 	<ul style="list-style-type: none"> Publishing of the document containing the norm in La Gaceta. 	<ul style="list-style-type: none"> Knowledge of health and environmental problems. Informed politicians. Informed parties about

Objectives	Indicators	Verification	Assumptions
residues.			environmental commitments.
2. To develop action plans and protocols for the operation and elimination of equipments with PCBs according to the norm.	<ul style="list-style-type: none"> • To implement the usage of protocols and record procedures, maintenance, follow-up and incorporation in an information system by a 100% of the industries that operate equipments with PCBs. • Training for the adequate operation of emergencies that may present in equipments containing PCBs. 70% decrease in spills in a 18 month period. 	<ul style="list-style-type: none"> • Published document containing management, record and PCBs final disposal methods. • Database containing updates of PCBs inventories. • Population records, management ability. 	<ul style="list-style-type: none"> • Knowledge of health and environmental problems. • Informed parties about environmental commitments. • Personnel training.
3. To establish temporary stocking infrastructures.	<ul style="list-style-type: none"> • Feasibility study and complete construction in 18 months. • Design of standardized temporary stockings centers according to good international practices (EPA, UE). • Stocking center built and functioning in 36 months. 	<ul style="list-style-type: none"> • Infrastructure acceptance document according to the reference terms. • Built and functioning infrastructure. • Audit documents about adequate functioning of the stocking center. 	<ul style="list-style-type: none"> • Available technical ability. • Available economic resources.
4. To train and inform.	<ul style="list-style-type: none"> • Personnel list of electric, public and private industries 	<ul style="list-style-type: none"> • Records of manuals and guidelines for the trainings. 	<ul style="list-style-type: none"> • Informed parties about environmental

Objectives	Indicators	Verification	Assumptions
	<p>directly or indirectly involved in the procedures related to equipments with PCBs.</p> <ul style="list-style-type: none"> • Training to a 90% of the employees that are directly involved in the operation and maintenance in all industries operating electric equipments potentially polluted with PCBs in a 12 months period. • Training to emergency personnel (Red Cross, fire department and CNE). 	<ul style="list-style-type: none"> • Records of participations of electric industries employees in the trainings. 	<p>commitments.</p> <ul style="list-style-type: none"> • Available technical ability. • Available economic resources.
5. To strengthen analytical ability.	<ul style="list-style-type: none"> • Accreditation of PCBs analysis procedures in at least 2 laboratories nationwide providing the service in a timely and trusting manner in a 24 months period. 	<ul style="list-style-type: none"> • Accreditation record of ECA PCBs tests. • List of trained personnel. 	<ul style="list-style-type: none"> • Available technical ability. • Available economic resources
6 a. To provide an adequate final disposal to equipments with PCBs.	<ul style="list-style-type: none"> • 5 years from now, decontamination and final disposal of 40% of equipments with PCBs. 	<ul style="list-style-type: none"> • Approved final disposal protocols. • Records of: <ul style="list-style-type: none"> - customs export, - Health Ministry export license (by the Basel Agreement) - national and international treatments centers. 	<ul style="list-style-type: none"> • Foreign finance cooperation. • Existing technical ability for an adequate PCBs final disposal.
Medium term 6-10 years			
6 b. To provide an adequate final disposal to equipments with PCBs	<ul style="list-style-type: none"> • 8 years from now, decontamination and final disposal of 80% equipments 	<ul style="list-style-type: none"> • Approved final disposal protocols. • Records of: 	<ul style="list-style-type: none"> • Foreign finance cooperation. • Existing technical ability for an adequate PCBs final

Objectives	Indicators	Verification	Assumptions
	with PCBs.	<ul style="list-style-type: none"> - customs export, - Health Ministry export license (by the Basel Agreement) - national and international treatments centers 	disposal.
7. To identify and characterize the places polluted with PCBS.	<ul style="list-style-type: none"> • To conduct a georeferenced diagnosis of polluted places in a 6 years period. 	<ul style="list-style-type: none"> • Document and database with the diagnosis handed over to DIGECA/MINAE. 	<ul style="list-style-type: none"> • Available economic resources. • Available technical ability.
8. To develop criteria to select methodologies and procedures to fix PCBs polluted places.	<ul style="list-style-type: none"> • Methodologies and procedures to value the risk and remediation of places with pesticides in a 6 years period. 	<ul style="list-style-type: none"> • Document containing developed criteria handed over DIGECA/MINAET 	<ul style="list-style-type: none"> • Available economic resources. • Available technical ability.
4. Activities			
1.1 To establish a technical committee for the development of the legislation.	<ul style="list-style-type: none"> • Established technical committee in a one month period. 	<ul style="list-style-type: none"> • Official acceptance letter of the members of the committee. 	<ul style="list-style-type: none"> • Awareness and availability of the institutions and industries related to PCBs problem.
1.2 To create a document of the norm.	<ul style="list-style-type: none"> • To develop the norm in a six months period. 	<ul style="list-style-type: none"> • Document containing the proposal of the norm in DIGECA, MINAE. 	<ul style="list-style-type: none"> • Active participation of the interested ones. • Available economic resources.
1.3 To approve the norm by means of an executive decree.	<ul style="list-style-type: none"> • Approval of the norm in a 9 months period. 	<ul style="list-style-type: none"> • Executive decree of the norm published in la Gaceta. 	<ul style="list-style-type: none"> • Political will.
2.1 To establish a committee for the development of an operation and final disposal of equipments with PCBs plan, subdivision of the department.	<ul style="list-style-type: none"> • Technical committee established in a one month period. 	<ul style="list-style-type: none"> • Official acceptance letter of the members of the committee. 	<ul style="list-style-type: none"> • Awareness and availability of the institutions and industries related to PCBs problem.
2.2 To develop the operation and final disposal of PCBs plan	<ul style="list-style-type: none"> • To develop the document in a four months period. 	<ul style="list-style-type: none"> • Document containing the proposal of the plan in 	<ul style="list-style-type: none"> • Approved legislation. • Awareness and availability

Objectives	Indicators	Verification	Assumptions
document.		DIGECA, MINAE.	of the institutions and industries related to PCBs problem.
2.3 Validation of the operation and final disposal of PCBs plan.	<ul style="list-style-type: none"> To conduct a validation workshop of the plan a month after execution of section 2.2. 	<ul style="list-style-type: none"> Validation final report in DIGECA/MINAET. 	<ul style="list-style-type: none"> Written plan document. Awareness and availability of the institutions and industries related to PCBs problem.
2.4 To train the personnel of electric industries on the operation and final disposal of PCBs plan.	<ul style="list-style-type: none"> To train identified personnel related to PCBs processes in electric industries in a two months period after concluded section 2.3. 	<ul style="list-style-type: none"> Training workshop reports DIGECA, MINAET. 	<ul style="list-style-type: none"> Written and approved plan document. Awareness and availability of the institutions and industries related to PCBs problem. Available economic resources.
2.5 To conduct application verification audits of the operation and final disposal of PCBs in electric industries plan.	<ul style="list-style-type: none"> To conduct 1 plan follow-up audit every six months in all electric industries. 	<ul style="list-style-type: none"> Audit final reports in DIGECA, MINAET. 	<ul style="list-style-type: none"> Awareness and availability of the institutions and industries related to PCBs problem. Available economic resources.
3.1 To establish technical criteria for the construction and operation of the stocking center.	<ul style="list-style-type: none"> Written document containing technical criteria for the selection and construction of the stocking center in a four months period. 	<ul style="list-style-type: none"> Document in DIGECA, MINAET and report document of the revision by the Technical Department of Coordination for the Management of Chemical Substances. 	<ul style="list-style-type: none"> Available technical ability. Available economic resources.
3.2 To analyze and select alternative places for the stocking center.	<ul style="list-style-type: none"> Search and analysis of the places established in a two months period. 	<ul style="list-style-type: none"> Analysis of the places report written document in DIGECA, MINAET. 	<ul style="list-style-type: none"> Available technical ability. Available economic resources.

Objectives	Indicators	Verification	Assumptions
			<ul style="list-style-type: none"> • Available places.
3.3 To design the stocking center.	<ul style="list-style-type: none"> • Design of the facility in six months. 	<ul style="list-style-type: none"> • Map and documents of the stocking center design in DIGECA, MINAET. 	<ul style="list-style-type: none"> • Available technical ability. • Available economic resources.
3.4. To define the administration of the stocking center.	<ul style="list-style-type: none"> • Administration assignment of the place in three months (after execution of activity 3.1). 	<ul style="list-style-type: none"> • Administration contract of the stocking center in DIGECA, MINAET. 	<ul style="list-style-type: none"> • Available economic resources. • Available candidates for the administration of the stocking center.
3.5. To establish procedures of operation and admission of PCBs in the stocking center.	<ul style="list-style-type: none"> • Procedures of operation and admission established in two months after activity 3.4. 	<ul style="list-style-type: none"> • Publishing of the procedures in La Gaceta. 	<ul style="list-style-type: none"> • Available technical ability. • Available economic resources.
3.6. To define rates for the stocking center.	<ul style="list-style-type: none"> • Analysis of the rate in a three months period. • Updates every year. 	<ul style="list-style-type: none"> • Publishing of the initial rate in La Gaceta, and publications post updates. 	<ul style="list-style-type: none"> • Available technical ability. • Available economic resources. • Updated data of PCBs inventory containing stock amounts in the country.
3.7. To conduct external audits of the stocking center functioning.	<ul style="list-style-type: none"> • Execution of an audit every six months. 	<ul style="list-style-type: none"> • Audit document in DIGECA, MINAE 	<ul style="list-style-type: none"> • Available technical ability. • Available economic resources. • Functioning stocking center.
4.1 To establish someone in charge of the trainings.	<ul style="list-style-type: none"> • To establish someone in charge of the training in a one month period. 	<ul style="list-style-type: none"> • Signing of the contract with the person in charge of the trainings. 	<ul style="list-style-type: none"> • Available technical ability. • Available economic resources. • People interested in participating as instructors.
4.2 To coordinate and establish the curricula and material related to the priorities defined	<ul style="list-style-type: none"> • To prepare the training document in a one month period 	<ul style="list-style-type: none"> • Document containing the training curricula handed over to DIGECA/MINAЕ. 	<ul style="list-style-type: none"> • Available technical information. • Available economic

Objectives	Indicators	Verification	Assumptions
for the training in the PCBs subject matter.			resources.
4.3 To conduct the trainings.	<ul style="list-style-type: none"> To conduct trainings in all electric industries in a three months period. 	<ul style="list-style-type: none"> Record of the participants of the trainings. 	<ul style="list-style-type: none"> Available economic resources. Awareness and availability of the institutions and industries related to PCBs problem.
5.1 To define the procedures for the analysis of accepted and recommended PCBs.	<ul style="list-style-type: none"> Document containing procedures develop in a three months period. 	<ul style="list-style-type: none"> Document containing guidelines of accepted procedures in DIGECA/MINAE. 	<ul style="list-style-type: none"> Available technical ability. Available economic resources.
5.2 To inform the laboratories about acknowledged and approved procedures for PCBs analysis.	<ul style="list-style-type: none"> To have coordination meetings with all laboratories having installed analytical ability that might help in PCBs analysis in a three months period. 	<ul style="list-style-type: none"> Training reports document. List of the participants. 	<ul style="list-style-type: none"> Available technical ability that might be adapted for PCBs analysis. Interest of the laboratories.
5.3 To establish a committee to follow-up and support the validation procedures.	<ul style="list-style-type: none"> Committee established in a one month period. 	<ul style="list-style-type: none"> Official acceptance letter of the members of the committee. 	<ul style="list-style-type: none"> Awareness and availability of the institutions, industries and laboratories related to PCBs problem.
6.1 To establish a protocol with general guidelines for final disposal of equipments with PCBs according to the norm.	<ul style="list-style-type: none"> Protocol developed in a two months period. 	<ul style="list-style-type: none"> Document containing the protocol in DIGECA/MINAE. 	<ul style="list-style-type: none"> Available technical ability Available economic resources.
6.2 To define the requirements that adequate places for final disposal of PCBs must comply.	<ul style="list-style-type: none"> Requirements defined in protocol in a two month period. 	<ul style="list-style-type: none"> Document containing requirements in DIGECA/MINAE. 	<ul style="list-style-type: none"> Available technical ability Available economic resources
6.3 To look for financing supporting activities for the final disposal of equipments with PCBs.	<ul style="list-style-type: none"> Financing strategies defined in a three months period. 	<ul style="list-style-type: none"> Document containing defined financing strategies in a three months period. 	<ul style="list-style-type: none"> Financing support.

Objectives	Indicators	Verification	Assumptions
7.1 To define strategies for making up the inventory of polluted places.	<ul style="list-style-type: none"> Methodology defined in a three months period. 	<ul style="list-style-type: none"> Document containing the methodology in DIGECA/MINAE. 	<ul style="list-style-type: none"> Available technical ability. Available economic resources.
7.2 To make up the inventory.	<ul style="list-style-type: none"> Inventory of polluted places carried out in a seven months period. 	<ul style="list-style-type: none"> Document containing final results of the PCBs polluted places inventory in DIGECA/MINAE 	<ul style="list-style-type: none"> Available technical ability. Available economic resources. Established methodology to carry out the inventory.
8.1 To establish a technical committee to define methodologies criteria and procedures to repair PCBs polluted places.	<ul style="list-style-type: none"> Technical committee established in a one month period. 	<ul style="list-style-type: none"> Official acceptance letter of the members of the committee. 	<ul style="list-style-type: none"> Awareness and availability of the institutions and industries related to PCBs problem.
8.2 To develop a document containing criteria and methodologies to repair polluted places.	<ul style="list-style-type: none"> To write the document in a four months period. 	<ul style="list-style-type: none"> Document containing criteria and methodologies handed over to DIGECA, MINAE 	<ul style="list-style-type: none"> Awareness and availability of the institutions and industries related to PCBs problem Available economic resources Available technical ability.

Pesticides Action Plan Logical Framework

Objectives	Indicators	Verification	Assumptions
1. Goal			
Reduce environmental problems as contamination and health which are derived from inadequate management of obsolete and existing COPs pesticides.	<ul style="list-style-type: none"> Lower level of impact on health as result of contamination of water and soil 	<ul style="list-style-type: none"> System of integral management of pesticides for the elimination of the existences of obsolete pesticides. 	<ul style="list-style-type: none"> Awareness of health and environmental problems related to obsolete and COPs pesticides.
2. Objectives			
Control contamination due to COPs pesticides and obsolete pesticides in Costa Rica	<ul style="list-style-type: none"> Elimination of 100% of the existences of obsolete pesticides 	<ul style="list-style-type: none"> Empty warehouses containing obsolete pesticides To have a complete register of all deliveries to final treatment for obsolete pesticides. 	<ul style="list-style-type: none"> Available budgets on the different companies for the elimination of obsolete pesticides. Political will to regulate the elimination of obsolete pesticides.
3. Outputs			
Short term 1-5 years			
1. Definition of policies and inter-sector plans for the management of expired pesticides and packages including the definition of procedures for the prevention of the outcome of expired pesticides.	<ul style="list-style-type: none"> Development and approval of policies and norms within the next 2 years. The collection site starts operations within a period of time of 18 months. 	<ul style="list-style-type: none"> Publication in the official La Gaceta of the documents about policies and regulations. <ul style="list-style-type: none"> Built Stocking Facility 	<ul style="list-style-type: none"> Awareness of health and environment problems associated with pesticides. Informed politicians. Informed parties about environmental compromises. Available economic resources. Available technical skills
2. To establish temporal collection infra structure	<ul style="list-style-type: none"> Feasibility studies and building over in 18 months. 	<ul style="list-style-type: none"> Document for the delivery of infrastructure according to reference terms. Infra structure is built and 	<ul style="list-style-type: none"> Available technical skills Available economic resources

Objectives	Indicators	Verification	Assumptions
	<ul style="list-style-type: none"> Operation of the center starts in 18 months 	<ul style="list-style-type: none"> in operation Audit documents about adequate performance of the collection site. 	
3. To carry out control and supervision on the importation of prohibited pesticides including COP's	<ul style="list-style-type: none"> Reduction of 100% of the importation of prohibited pesticides and COPs in 6 months. 	<ul style="list-style-type: none"> Registration of the importation of pesticides at Customs. 	<ul style="list-style-type: none"> Available economic resources. Available technical skills. Compromise of all the parties involved in the management of COPs pesticides.
4. To give training to entities in charge of emergencies and natural and technological disasters about the management of pesticides in emergency situations.	<ul style="list-style-type: none"> Development of policies, procedures and permanent training protocols within 6 months. To give training to emergency committees in at least 3 priority communities which are directly related with the management of pesticides within 6 months. 	<ul style="list-style-type: none"> Document containing the procedures and training protocols placed in DIGECA/MINAE. Lists de participants and reports about trainings 	<ul style="list-style-type: none"> Available economic resources Available technical skills. Compromise of the parties and communities which are engaged in the management of COPs pesticides.
5. To develop action plans to eliminate expired pesticides. These plans are sponsored by the Secretary in coordination with MAG, Ministry of Health and MINAET	<ul style="list-style-type: none"> Plans of action, established and in execution within 6 months. 	<ul style="list-style-type: none"> Documents containing the action plans placed in DIGECA/MINAE 	<ul style="list-style-type: none"> Available economic resources Available technical skills Compromise of the parties engaged in the management of COPs pesticides. Finished inventory of

Objectives	Indicators	Verification	Assumptions
			pesticides.
6. To develop educational and informative campaigns about the reductions of risks in the management of pesticides.	<ul style="list-style-type: none"> To have at least one informed and aware community in the management and final disposal of pesticides within 6 months. 	<ul style="list-style-type: none"> Documents with the contents of educational campaigns placed in DIGECA/MINAE. Reports about trainings Reduction of accidents caused by pesticides in the community. 	<ul style="list-style-type: none"> Available economic resources Available technical skills Compromise of the community
Mid 6-10 years			
7. to identify and feature those sites contaminated with pesticides.	<ul style="list-style-type: none"> To develop a geo-referenced diagnosis of contaminated sites within 6 years. 	<ul style="list-style-type: none"> Document and data base with diagnosis placed in DIGECA/MINAE 	<ul style="list-style-type: none"> Available economic resources Available technical skills .
8. To develop selection criteria for methodologies and procedures to remedy sites contaminated with COPs pesticides.	<ul style="list-style-type: none"> Methodologies and procedures for risk evaluation and remediation of sites contaminated with COPs pesticides elaborated within 6 months. 	<ul style="list-style-type: none"> Document containing criteria placed in DIGECA/MINAE 	<ul style="list-style-type: none"> Available economic resources Available technical skills.
9. To develop the necessary measures to reduce negative social impact of the management of pesticides.		<ul style="list-style-type: none"> Negative social impact of the management of pesticides mitigated and compensated. 	<ul style="list-style-type: none"> Available economic resources. Available technical skills Compromise of the community.
4. Activities			
1.1 To establish a special committee for the elaboration of policies and plans for the management of expired	<ul style="list-style-type: none"> Technical committee established within a month. 	<ul style="list-style-type: none"> Acceptance official letter from the parties forming the committee. 	<ul style="list-style-type: none"> Awareness and availability of institutions, enterprises and communities related with the problem of

Objectives	Indicators	Verification	Assumptions
pesticides.			pesticides.
1.2 Elaboration of the management plan document for expired pesticides	<ul style="list-style-type: none"> Elaboration of the document within 6 months. 	<ul style="list-style-type: none"> Document containing the proposal for the management plan placed in DIGECA, MINAE 	<ul style="list-style-type: none"> Awareness and availability of institutions, enterprises and communities related with the problem of pesticides.
1.3 Validation of management plan for expired pesticides.	<ul style="list-style-type: none"> Preparation of a workshop for the validation of the management plan within a month after the execution of point 1.2 	<ul style="list-style-type: none"> Final validation report placed in DIGECA/MINAE 	<ul style="list-style-type: none"> Management plan document, finished. Awareness and availability of institutions, enterprises and communities related with the problem of pesticides.
1.4 To train the different companies and personnel involved in the management of expired pesticides	<ul style="list-style-type: none"> To give training through workshops to the main enterprises involved in the management of expired pesticides within 3 months after the conclusion of point 1.3 Coordination with formulation enterprises for the training of their personnel in the management of expired pesticides. 	<ul style="list-style-type: none"> Report about training workshops. 	<ul style="list-style-type: none"> Document for the plan, elaborated and validated. Awareness and availability of institutions, enterprises and communities related with the problem of expired pesticides. Available economic resources.
1.5 To carry out verification audits about the application of management plan and the final disposal of expired pesticides and COPs in the companies involved in the matter.	<ul style="list-style-type: none"> To perform 1 follow up audit every 6 months in all the companies involved in the matter. 	<ul style="list-style-type: none"> Final reports about the audits, received and analyzed in MAG 	<ul style="list-style-type: none"> Awareness and availability of institutions and enterprises related with the problem of expired pesticides. Available economic resources.

Objectives	Indicators	Verification	Assumptions
2.1 To establish technical criteria for the building and operation of collection the collection site.	<ul style="list-style-type: none"> Document elaborated with technical criteria for the selection and building of the collection site within 4 months. 	<ul style="list-style-type: none"> Document in DIGECA, MINAE and document with the review report from Technical Department for Chemical Substances Management. 	<ul style="list-style-type: none"> Available technical skills Available economic resources.
2.2 To analyze and select the different alternatives for the collection site.	<ul style="list-style-type: none"> Search and analysis of established sites within 2 months. 	<ul style="list-style-type: none"> Written document with the report of analysis of the sites. 	<ul style="list-style-type: none"> Available technical skills Available economic resources Available sites
2.3 To design the collection site	<ul style="list-style-type: none"> Design of collection site ready in 6 months. 	<ul style="list-style-type: none"> Plans and documents of the design of the collection site approved and placed in DIGECA, MINAE 	<ul style="list-style-type: none"> Available technical skills Available economic resources.
2.4. To define the administration of collection site.	<ul style="list-style-type: none"> Appointment of the administration of the site within 3 months (after the execution of point 3.1). 	<ul style="list-style-type: none"> Contract for the Administration of the collection site in DIGECA, MINAE. 	<ul style="list-style-type: none"> Available technical skills. Available economic resources. Available candidates for the administration of the collection site.
2.5. To establish the procedures for the management and entrance of expired pesticides and contaminated containers into the collection site.	<ul style="list-style-type: none"> Procedure for the management and entrance established within two months, after activity 3.4. 	<ul style="list-style-type: none"> Publication of procedure in La Gaceta. 	<ul style="list-style-type: none"> Available technical skills. Available economic resources.
2.6. To establish the fees to charge in the collection site.	<ul style="list-style-type: none"> Analysis of the fee within 3 months. Yearly update of fees. 	<ul style="list-style-type: none"> Publication of initial fee in La Gaceta and publication of every posterior update 	<ul style="list-style-type: none"> Available technical skills Available economic resources. Updated data of the inventory of expired pesticides with the amounts existing in the country.

Objectives	Indicators	Verification	Assumptions
2.7. To perform external audits tending to determine the functioning of the collection site.	<ul style="list-style-type: none"> Execution of an audit. Every 6 months. 	<ul style="list-style-type: none"> Audit documents in DIGECA, MINAE 	<ul style="list-style-type: none"> Available technical skills Available economic resources. Collection site operating
3.1 To establish a technical committee in charge of verification audits related to the control of illicit traffic of COPs pesticides.	<ul style="list-style-type: none"> Technical committee established within a month. Training to customs personnel, guardians, and regional agricultural centers, among others. 	<ul style="list-style-type: none"> Official acceptance letter from the parties forming the committee 	<ul style="list-style-type: none"> Awareness and availability of the parties related with the problem of COPs pesticides.
3.2 To perform verification audits to assess the prohibition for the importation of prohibited pesticides, including COPs pesticides.	<ul style="list-style-type: none"> To perform 1 audit every 3 months. 	<ul style="list-style-type: none"> Final audit reports. 	<ul style="list-style-type: none"> Available economic resources Awareness and availability of the different parties related with the problem of COPs pesticides.
4.1 To select the communities that will be receiving the training.	<ul style="list-style-type: none"> To establish at least 3 priority communities that needs the training within a month. 	<ul style="list-style-type: none"> Document with the list of selected communities and its rationale 	<ul style="list-style-type: none"> Awareness and availability of the different parties related with the problem of COPs pesticides. Available information about the problem of the handling of pesticides in the different towns in the country.
4.2 To establish the contents and methodology of the training.	<ul style="list-style-type: none"> To develop the content and methodology of the training within 3 months. 	<ul style="list-style-type: none"> Document with content and methodology of the training. 	<ul style="list-style-type: none"> Available economic resources Available technical skills
4.3 To carry out the trainings.	<ul style="list-style-type: none"> To carry out the trainings in at least 3 communities within 6 months. 	<ul style="list-style-type: none"> Document with training procedures and protocols placed in 	<ul style="list-style-type: none"> Available economic resources Available technical skills.

Objectives	Indicators	Verification	Assumptions
		<p>DIGECA/MINAE.</p> <ul style="list-style-type: none"> • Lists of participants and reports of the trainings. 	<ul style="list-style-type: none"> • Compromise from the parties and communities involved in the management of COPs pesticides.
5.1 To establish a protocol with general guidelines for final disposal of expired pesticides and packages.	<ul style="list-style-type: none"> • Protocol is elaborated within 2 months. 	<ul style="list-style-type: none"> • Document with the protocol placed in DIGECA/MINAE 	<ul style="list-style-type: none"> • Available technical skills. • Available economic resources.
5.2 To define the requirements of an adequate place for the final disposal of expired pesticides and packages.	<ul style="list-style-type: none"> • Requirements are defined in a protocol within 2 months. 	<ul style="list-style-type: none"> • Document with requirements placed in DIGECA/MINAE 	<ul style="list-style-type: none"> • Available technical skills • Available economic resources.
5.3 To get financial support to invest in the activities related to final disposal of expired pesticides and packages.	<ul style="list-style-type: none"> • The strategies to get financial support defined within 3 months. 	<ul style="list-style-type: none"> • Document with defined strategies for financial support within 3 months. 	<ul style="list-style-type: none"> • Support for financing.
6.1 To establish which are the communities at risk in order to work educative campaigns	<ul style="list-style-type: none"> • At least one community identified and with explicit interest in the training within one month. 	<ul style="list-style-type: none"> • Compromise letter from the community. 	<ul style="list-style-type: none"> • Compromise from the community.
6.2 To elaborate a training program to attend specific needs of the communities	<ul style="list-style-type: none"> • Training program elaborated within one month. 	<ul style="list-style-type: none"> • Document with the training program. 	<ul style="list-style-type: none"> • Available technical skills. • Available economic resources.
6.3 To carry out the training	<ul style="list-style-type: none"> • Training executed within one month. 	<ul style="list-style-type: none"> • Document for the evaluation of the training. 	<ul style="list-style-type: none"> • Available technical skills • Available economic resources. • Compromise from the community
7.1 To establish the methodology for the inventory of contaminated sites	<ul style="list-style-type: none"> • Methodology established within 3 months. 	<ul style="list-style-type: none"> • Document with methodology placed in DIGECA/MINAE 	<ul style="list-style-type: none"> • Available technical skills • Available economic resources.

Objectives	Indicators	Verification	Assumptions
7.2 To carry out the inventory	<ul style="list-style-type: none"> Inventory of contaminated sites done within 7 months. 	<ul style="list-style-type: none"> Document with the results of the final inventory of the sites contaminated with pesticides in DIGECA/MINAE 	<ul style="list-style-type: none"> Available technical skills Available economic resources. Methodology for the inventory is established..
8.1 To establish a technical committee to define methodology criteria and the procedures to remedy sites contaminated with COPs pesticides.	<ul style="list-style-type: none"> Technical committee established within one month. 	<ul style="list-style-type: none"> Official acceptance letter from the parts forming the committee. 	<ul style="list-style-type: none"> Awareness and availability of the different parties related with the problem of COPs pesticides.
8.2 To elaborate the document with the criteria and methodologies to remedy contaminated sites.	<ul style="list-style-type: none"> To elaborate the document within 4 months. 	<ul style="list-style-type: none"> Document with criteria and methodologies placed in DIGECA, MINAE 	<ul style="list-style-type: none"> Awareness and availability of the different parties related with the problem of COPs pesticides. Available economic resources. Available technical skills.

Dioxins and Furans Action Plan Logical Framework

Objectives	Indicators	Verification	Assumptions
1. Goal			
To reduce environmental problems of health and contamination derived from the non intentional generation of dioxins and furans.	<ul style="list-style-type: none"> Lower levels of impact on health as result of contamination of the air, water and soil with dioxins and furans. 	<ul style="list-style-type: none"> Systems of integral management in generating enterprises with the goals of reducing the emissions of dioxins and furans. 	<ul style="list-style-type: none"> Awareness of health and environment problems associated with the generation of dioxins and furans.
2. Objectives			
To control contamination generated by the emission of dioxins and furans in Costa Rica	<ul style="list-style-type: none"> Decrease of emissions of dioxins and furans as result of voluntary agreements consolidated in 25% of the industrial and agricultural sector. 	<ul style="list-style-type: none"> List of voluntary agreements signed and registered in DIGECA, MINAET and in execution. 	<ul style="list-style-type: none"> Industrial and agricultural sector interested in improving their management by the implementation of voluntary agreements.
3. Outputs			
Short term 1-5 years			
1. To develop and implement environmental management methods including prevention and control of contamination, mainly the one produced by COPNI emissions.	<ul style="list-style-type: none"> Plans of environmental management for dioxins and furans in execution in priority sectors within 18 months. The plans should include standardized and coordinated requirements between Ministry of Health, MINAET and MEIC. 	<ul style="list-style-type: none"> Document of the management plan and posterior audits to the plan. 	<ul style="list-style-type: none"> Available economic resources. Awareness and will of involved sectors. Available technical skills.
2. To develop data bases and analysis of the information about non intentional emissions of dioxins and furans and their source, by sectors in the country.	<ul style="list-style-type: none"> Information system developed within 2 years. Results of the analysis of estimated emissions included in data base within two years 	<ul style="list-style-type: none"> Data base 	<ul style="list-style-type: none"> Available economic resources.. Awareness and will of involved sectors.

Objectives	Indicators	Verification	Assumptions
Data bases with supported information that could be incorporated into the COPs data base.	and afterwards permanently updated.		
3. To develop pilot plans to investigate and implement, by sector or productive activity, the best available technologies and the best environmental practices that could be viable to the situation of the country. Specific projects on: a. agricultural sector : pineapple and sugar cane b. rural sector : management of domestic wastes c. industrial sector: limestone quarry and galvanizers.	<ul style="list-style-type: none"> • Pilot projects implemented by sector or productive activity with the best available technologies and their viability and the best environmental practices • Reduction of 10% per year of agricultural burnings 	<ul style="list-style-type: none"> • Guide document for pilot project • Verification of reduction of burning areas • Reduction of generated emissions. • Crossed information with REGENCIALES reports. 	<ul style="list-style-type: none"> • Information available and applicable to the situation of the country about the best technologies available and the best environmental practices in the field of dioxins and furans. • Available economic resources. • Awareness and will of involved sectors. • Available technical skills. • Compromise from the community. • Compromise from agricultural and industrial sector.
4. To establish policies and incentives to induce the use of the best available technology and the best environmental practices.	<ul style="list-style-type: none"> • Policies and incentives elaborated and validated by Technical Department for Chemical Substances Management and published in La Gaceta, to foster the use of the best available technology and the best environmental practices within 8 months. 	<ul style="list-style-type: none"> • Document about policies and incentives elaborated and published. 	<ul style="list-style-type: none"> • Political will • Availability and compromise for active participation in the Secretary.
5. To develop systematic educative programs about harmful productive practices with	<ul style="list-style-type: none"> • Policies, procedures and permanent training protocols established and working 	<ul style="list-style-type: none"> • Document with policies, procedures and training protocols. 	<ul style="list-style-type: none"> • Available economic resources. • Available technical skills. • Compromise form problematic

Objectives	Indicators	Verification	Assumptions
impact on environment and the management of solid wastes in problematic sectors in relation to dioxins and furans.	<p>within 12 months.</p> <ul style="list-style-type: none"> • Didactic material, elaborated, published and in use within 9 months. • Personnel from the largest generators of dioxins and furans trained in the development of productive practices with harmless impact on environment and the management of solid wastes within 18 months. 	<ul style="list-style-type: none"> • Didactic material for primary school and college. • Incorporation of the matter in the courses of those careers related to chemical substances. • Courses of continuous education about the theme in professional colleges to create awareness. • Reports about trainings performed. 	sectors involved.
6. To strengthen the conditions to face emergencies and natural and technological disasters related to the generation of dioxins and furans in emergency situations.	<ul style="list-style-type: none"> • Plan elaborated for the attention of emergencies within one year. • The data base must indicate level of danger of chemical substances used in the place to facilitate the response in case of emergency or disaster. 	<ul style="list-style-type: none"> • Plan for the attention of emergencies, elaborated. 	<ul style="list-style-type: none"> • Available economic resources. • Available technical skills. • Training to firemen groups and the Comisión Nacional de Emergencia.
6-10 years			
7 To define indicators, by sector, to assess the efficiency of the implementation of the best available technologies and the best environmental practices.	5. Efficiency indicators established within 8 months.	<ul style="list-style-type: none"> • Document with defined indicators. 	<ul style="list-style-type: none"> • Available technical skills. • Available economic resources.
8. To elaborate norms in relation with the emission of dioxins and furans and allowed limits.	7. Norms elaborated, approved and published within 18 months.	<ul style="list-style-type: none"> • Norms published in La Gaceta 	<ul style="list-style-type: none"> • Political will • Available technical skills.
9. To develop the ability to perform analysis and control of	8. At least 3 national laboratories with implemented and accredited	<ul style="list-style-type: none"> • Document of the accreditation 	<ul style="list-style-type: none"> • Available economic resources • Available technical and

Objectives	Indicators	Verification	Assumptions
the emission of dioxins and furans.	analysis for furans and dioxins within 1 year.		<ul style="list-style-type: none"> analytical skills. • Compromise from laboratories.
10. To develop mechanisms for the generation of information regarding the emissions of dioxins and furans. The information is obtained from a new requirement at the moment of requesting authorization and includes information about the generation of dioxins and furans and to update the inventory data base.	10.1 Implementation of the new requirement in the working authorization within 8 months. 10.2 Permanent update of the data base since de implementation of the new requirement.	<ul style="list-style-type: none"> • New requirements for the working authorization published Data base updated. 	<ul style="list-style-type: none"> • Political will • Available technical skills.
11. To develop necessary measures to minimize negative social impact of the management of dioxins and furans.	<ul style="list-style-type: none"> • Reduction OF 50% of agricultural burnings. • Reduction OF 50% of respiratory diseases in the communities near pineapple and sugar cane plantations. 	<ul style="list-style-type: none"> • Mitigation of negative social impact to health as result of the generation of dioxins and furans through burnings 	<ul style="list-style-type: none"> • Available economic resources • Available technical skills. • Compromise from the community. • Compromise from industrial and agricultural sectors.
4. Activities			
1.1 To define and carry out a workshop program for the SENSIBILIZACION and the search for technological alternatives in priority sectors according to the amount of emissions	<ul style="list-style-type: none"> • SENSIBILIZACION workshops, by guild, executed in those sectors with the highest production of emissions within 12 months. • Program for development, implementation and follow up completed within 18 months with the corresponding monitoring by MINAET and 	<ul style="list-style-type: none"> • Workshops report • Document to the program 	<ul style="list-style-type: none"> • Available economic resources. • Awareness and compromise of involved sectors. • Available technical skills.
1.2 To establish a program for the development, implementation and follow			

Objectives	Indicators	Verification	Assumptions
up of management plans in interested companies which generate the largest amounts of emissions	Ministry of Health. <ul style="list-style-type: none">• Generation of management plan.		
2.1 To update data for the calculation of the emission of dioxins and furans. 2.2 To establish a plan for the development, feeding and updating of data base. 2.3 To obtain funds for the updating of estimation data. 2.4 To develop information system to sep an updated inventory of estimated emissions of dioxins and furans.	<ul style="list-style-type: none">• Data base developed and administered by governmental instance, sustainable in time with real and estimated-in inventory data within 10 months and updated every 2 years.	<ul style="list-style-type: none">• Results of monitoring• Data bases in use.	10. Available economic resources. 11. Available technical and analytical skills. 12. Awareness and compromise of involved sectors.
3.1 To establish which are the best available techniques and the best environmental practices and their viability, including the management of agricultural residues for each priority sector according to the estimated amount of emissions of dioxins and furans. 3.2 To carry out an information workshop about the best available practices in each sector for the minimization of the amount of emissions of	<ul style="list-style-type: none">• Project for the acquisition of information by sector and availability of such information in the web site within 8 months.• 1 handbook for the management of dioxins and furans by sector within 8 months.• 1 handbook of good agricultural practices for pineapple and sugar cane• Voluntary agreements for a cleaner production settled with representatives of sugar cane,	<ul style="list-style-type: none">• Information in web site.• Manuals for the management of dioxins and furans by sector.• Reports about trainings.• Reports from the monitoring committee• Document in DIGECA, MINAET with voluntary agreements duly signed and the execution reports.	<ul style="list-style-type: none">• Information about the best available technologies and the best environmental practices in the field of dioxins and furans available and applicable to the situation of the country• Available economic resources.• Awareness and compromise of involved sectors.• Productive sectors aware and participating in voluntary agreements for a cleaner production.

Objectives	Indicators	Verification	Assumptions
dioxins and furans. 3.3 To include the information in the web site for PNI. 3.4 To establish a technical committee in charge of monitoring the application of the best available technologies and the best environmental practices in priority sectors.	pineapple, galvanization and limestone quarries. <ul style="list-style-type: none">• Priority sectors trained within 18 months.• Monitoring committee established within 6 months.	<ul style="list-style-type: none">• Document containing the handbook for good practices.	
4.1 To coordinate through the Technical Department an interministry policy of incentives. 4.2 To establish an environmental seal including improvement in the management of dioxins and furans. 4.3 To negotiate with the bank for mild credits for the implementation of BATs and BETs.	<ul style="list-style-type: none">• Incentive policy established within 10 months.• Project of environmental seal established within 10 months.• Number of credits per sector per year.	<ul style="list-style-type: none">• Document containing the incentive policy published.• Project of environmental seal elaborated and published.	<ul style="list-style-type: none">• Political will• Availability of a secretary.• Opening of a credit line for cleaner production projects.
5.1 To carry out a awareness workshop with Ministry of Education (people in charge of environmental education in primary and secondary education) 5.2 To establish the inclusion of the specific issue of Dy F in	<ul style="list-style-type: none">• Inclusion of the issue of dioxins and furans generation as result of open sky burnings in the programs of the Ministry of Education (target group: future D and F generator) within 18 months.• Training program for	<ul style="list-style-type: none">• Training document• Report about trainings.• Reduction in the number of open sky burnings and emergencies generated by dioxins and furans.	<ul style="list-style-type: none">• Available economic resources.• Available technical skills.• Compromise from problematic sectors involved.

Objectives	Indicators	Verification	Assumptions
each level. 5.3 To carry out training workshops (continued education) in superior educational entities, professional colleges and others.	industrial and agro industrial sector (target group: present D and F generator) executed within 12 months		
6.1 To determine technical criteria for the definition of present and future hard points. 6.2 To establish a proposal tending to add pertinent information that would allow the inclusion of a specific productive activity a potential D and F generator by means of environmental impact studies submitted in SETENA 6.3 To give training to people in charge of emergencies about the problems associated with dioxins and furans.	<ul style="list-style-type: none"> • Map of hot points (potential generators) in case of technologic accidents within 6 months. • Proposal for addition of information in the studies of environmental impact in execution within 10 months. • Trained personnel in the management of emergencies caused by dangerous substances generating D and F within 10 months. 	<ul style="list-style-type: none"> • Map of hot points • Document with new requirements for environmental impact studies. • List of trained personnel 	<ul style="list-style-type: none"> • Available economic resources • Available technical skills
10.1 To develop a pilot plan with at least 10 enterprises (2 per category) to define the indicators needed to evaluate proposed technologies and environmental practices.	<ul style="list-style-type: none"> • Indicators defined within 8 months for at least 5 categories with major emissions including the ones not estimated because lack of information. 	<ul style="list-style-type: none"> • Pilot plan executed • Document with indicators established. 	<ul style="list-style-type: none"> • Available technical skills. • Available economic resources.
8.1 To review international norms. 8.2 To formulate a participative normative for involved sectors.	<ul style="list-style-type: none"> • Norm elaborated and approved within 18 months. 	<ul style="list-style-type: none"> • Normative published in La Gaceta 	<ul style="list-style-type: none"> • Political will • Willingness of involved

Objectives	Indicators	Verification	Assumptions
8.3 To approve and publish the normative.			<ul style="list-style-type: none"> • sectors. • Available technical skills.
9.1 To obtain funds for the training of national professionals in the sampling and analysis of dioxins and furans. 9.2 To establish strategic alliances with worldwide laboratories for the transference of knowledge. 9.3 To carry out inter laboratory tests for the accreditation of sampling and analysis procedures.	<ul style="list-style-type: none"> • Funds for trainings established within 7 months. • Alliances established within 7 months. • Inter-laboratory tests performed by interested laboratories (at least 3) within 18 months. 	<ul style="list-style-type: none"> • List of trained personnel • Results of inter-laboratory tests 	<ul style="list-style-type: none"> • Available economic resources. • Available technical and analytical skills. • Willingness from laboratories involved.
10.1 To analyze requirements, procedures and periodicity of operational authorizations in sectors considered as dioxins and furans generators. 10.2 To design an automatized information system. 10.3 To define system administrator and to train users that will feed the information.	<ul style="list-style-type: none"> • Operation authorizations reformulated with information regarding the emission of dioxins and furans within 8 months. • Updated information system as per the implementation of the new requirement. 	<ul style="list-style-type: none"> • New requirements for operational authorization published • Updated data base. 	<ul style="list-style-type: none"> • Political will • Available technical skills.
To strengthen and consolidate the process of voluntary agreements for a cleaner production in the industrial and agricultural sectors.	<ul style="list-style-type: none"> • 10 voluntary agreements in agricultural sector: pineapple and sugar cane. • 5 voluntary agreements in industrial sector: 	<ul style="list-style-type: none"> • Documents with agreements signed and in execution. 	<ul style="list-style-type: none"> • Available economic resources. • Available technical and analytical skills. • Willingness of involved

Objectives	Indicators	Verification	Assumptions
	galvanizers and limestone quarries.		sectors.

Citizen Awareness, Communication and Participation Logical Framework

	Indicators	Verification	Assumptions
1. Goal			
To reduce environmental problems of health and contamination derived from the existences and generation of COPs.	<ul style="list-style-type: none"> Lower level of impact on health as result of the contamination of air, water and soil with COPs. 	Plans and control and monitoring register of health in hot points in agricultural, electric generation and industrial sectors.	<ul style="list-style-type: none"> Knowledge of health and environmental problems associated with the generation of
2. Objectives			
To help in the implementation of PNI for the elimination and/or reduction of COPs in Costa Rica	<ul style="list-style-type: none"> Population aware of the need to implement the action plans for the reduction and elimination of COP's 	<ul style="list-style-type: none"> Communities organized and enterprises involved in the implementation of the action plans contained in PNI (voluntary agreements) 	<ul style="list-style-type: none"> Key agents are receptive to the campaign about the matters of the NIP Knowledge of health and environment problems
3. Outputs			
1. To strengthen the strategy of SENSIBILIZACION and communication for information and education of citizens about the problem of organic persistent pollutants (POP's) and priorities established in the National Implementation Plan promoting the participation of the Ministry of Education, INA, Institutions of Superior Education, professional associations, ONGs, among others.	<ul style="list-style-type: none"> Courses and any other alternative promoted from MEP, INA and others addressed to general population about the issue of COPs and the priorities established in NIP Use of materials elaborated to treat the problem of persistent organic pollutants (POP's) 	<ul style="list-style-type: none"> Didactic material to be used in: Ministry of Public Education, INA, Institutions of Superior Education, professional associations, ONGs among others. Policies and mechanisms defined, approved and implemented in the different institutions (MEP, INA etc) for the inclusion of the POPs issue. 	<ul style="list-style-type: none"> Stockholm Agreement ratified Institutions are interested and compromised with the matter.
2. To strengthen actions tending to place the matters of the	<ul style="list-style-type: none"> A campaign about the matters of NIP addressed to key 	<ul style="list-style-type: none"> External signals of the campaign (brochure, radio 	<ul style="list-style-type: none"> Key agents are receptive to the campaign about the

	Indicators	Verification	Assumptions
National Implementation Plan for the reduction of COPs with clue social actors: ministries, academia, industries, agriculture, community associations.	<p>agents</p> <ul style="list-style-type: none"> • Key agents promote actions in relation with the matter of COPs and the priorities of PNI 	<p>spaces, unfolds etc)</p> <ul style="list-style-type: none"> • Register of actions of key agents in relation with the issue of COPs in MINAET 	<p>matters of the NIP</p> <ul style="list-style-type: none"> • Knowledge of health and environment problems. • Informed politicians. • Informed parties about environmental compromises.
3. Promote and support the establishment of mechanisms inside the Secretary to strengthen synergies with other programs or projects (for example: Peace with Nature) for the SENSIBILIZAION and informed and organized participation of the different sectors of society in relation with the management of COPs and the National Implementation Plan.	<ul style="list-style-type: none"> • # of established alliances • Actions promoted within the logic of synergies stimulated through the Programs for the AWARENESS and informed and organized participation in the management of COPs 	<ul style="list-style-type: none"> • Reports of activities or working plan proposals • Register of performed activities (reports, memories, proposals etc) 	<ul style="list-style-type: none"> • Receptive attitude from the Programs coordinators (specially Peace with Nature) in order to coordinate actions.
4. Activities			
1.1 To establish a visits schedule (MEP, INA etc) 1.2 Formalization of agreements 1.3 Support from the Plan to the Program for the development or planning of certain issues or course programs. 1.4 Identification of didactic materials to be produced. 1.5 Advise in the process of the elaboration of materials. 1.6 Validation of materials. 1.7 Evaluation of the efficacy and	<ul style="list-style-type: none"> • # of formalized agreements with institutions. • # of courses or other planned training activities. • # didactic materials produced • Training programs at MEP and universities about the matter. 	<ul style="list-style-type: none"> • Definition of the contents about the matter of COPs to be included in the programs and didactic material in MEP, INA, universities among others. • Agreements' documents. • Official material for the courses and/or training activities. • Didactic material produced. 	<ul style="list-style-type: none"> • Available economic resources in public institutional POAs • Awareness and compromise of involved sectors. • Available technical skills for AWARENESS and training in institutions, communities and enterprises.

	Indicators	Verification	Assumptions
impact of the training and awareness activities.			
2.1 Definition of reference terms for communication consults 2.2 Contracting of communication consulting company 2.3 Definition of key agents with the company. 2.4 General guidelines for the strategy. 2.5 Elaboration of the strategy. 2.6 Implementation of the strategy (with validation of message processes) 2.7 Monitoring and follow up for the campaign. 2.8 Awareness of social communicators and institutions in charge of the formation of these people about the matter of COPs. 2.9 Awareness of community organizations about the matter of COPs.	<ul style="list-style-type: none"> • Hired company • Document with the campaign strategy • Communication products elaborated. • Number of awareness courses or activities, planned and performed. • Number of bulletins or didactic material. 	<ul style="list-style-type: none"> • Contracting of company • Document of communication strategy • External signals for the campaign. • Evaluation of the impact of the campaign. • Didactic material produced. • Register of participation in training courses. 	<ul style="list-style-type: none"> • International economic support for the implementation of communication plans. • Awareness and willingness of involved sectors. • Available technical skills for awareness and training in institutions, communities and enterprises
3.1 To establish contact with programs 3.2 Validation of co-operation agreements. 3.3 Definition of joint actions 3.4 Activity implementation 3.5 To establish contact with the industries to include the subject matter of social	<ul style="list-style-type: none"> • Concrete coordination with Programs. • Document for validation of agreement. • Working plan • Implementation of activities • Number of enterprises with programs of social 	<ul style="list-style-type: none"> • Meetings minute, validation letters for the co-operation agreements between Programs, documents of working plans, register of activities. • Meeting minute with enterprises that count with programs of social 	<ul style="list-style-type: none"> • Economic resources for the execution of joint activities. • Awareness and willingness of involved sectors. • Technical secretary incorporates the programs able to create synergies into it's plan of action

	Indicators	Verification	Assumptions
industry responsibility plans.	responsibility that have incorporated the matter of COPs.	responsibility.	

VI. NIP Implementation Budget
2009 – 2019

Table 40 National Implementation Plan Budget

Products	Amount
Action Plan-Legal Strengthening	USD\$ 30,000.00
1. To establish a national policy leaded by the MINAET in coordination with the Health Ministry for the integral management of chemical products and their residues in the country.	7,500.00
2. To create legal instruments related to the management of existing POPs and generated residues.	15,000.00
3. To establish an economic instruments and incentives policy of recognition or other for the adequate management of chemical substances in general and especially POPs.	7,500.00
Action Plan – Institutional Strengthening	USD\$ 40,000.00
1. To strengthen, within the Technical Department, intersector coordination for an integral management focused in the life cycle of chemical substances.	10,000.00
2. To strengthen the capacities to supervise and to follow up the safe operation of dangerous chemical substances.	30,000.00
Action Plan – PCBs Management	USD\$ 7,056,000.00
1. To develop and update legislation with clear norms for the adequate management of PCBs and related residues.	5,000.00
2. To develop action plans and protocols for the operation and elimination of equipment with PCBs according to the norm.	20,000.00
3. To establish temporary stocking and decontamination of transformers infrastructure.	6,000,000.00
4. To train and inform about PCBs management.	6,000.00
5. To strengthen national analytical capacity.	25,000.00
6. To provide the adequate final disposal to equipment with PCBs.	400,000.00
7. To identify and characterize the places polluted with PCBs.	500,000.00

Products	Amount
8. To develop criteria to select methodologies and procedures to repair the places polluted with PCBs.	100,000.00
Action Plan – POPs Pesticides and Expired Management	USD\$ 255,000.00
1. To define policies and intersector plans of expired pesticides management and of packages including methodologies to prevent the generation of expired pesticides.	10,000.00
2. To establish temporary stocking infrastructure.	200,000.00
3. To control and supervise the import of prohibited pesticides including POPs.	20,000.00
4. To provide training to the emergency and natural and technological disaster attention brigades about pesticides operation in emergency situations.	15,000.00
5. To develop action plans to eliminate expired pesticides promoted by the Secretary in coordination with MAG, Health Ministry and MINAET.	10,000.00
Action Plan – Dioxins and Furans Management	USD\$ 1,050,000.00
1. To develop and implement environmental management methods integrating prevention and control of pollution especially COPNI releases.	30,000.00
2. To develop a database and information analysis of unintentional releases of dioxins and furans and their sources, by sector in the country, with supported information that might be incorporated in the POPs database.	250,000.00
3. To develop pilot plans that permit research and implement, by sector or productive activity, the best available techniques feasible for the situation of the country. Projects specifically in: <ul style="list-style-type: none"> a. Agricultural sector: pineapple and cane b. Rural sector: management of domestic residues c. Industrial sector: caleras y galvanizadoras 	700,000.00
4. To establish policies and incentives to promote the usage of the best available technologies and the best environmental practices.	25,000.00

Products	Amount
5. To develop systematic educational programs in awareness of harmful productive practices to the environment and operation of solid residues for problematic sectors in the dioxins and furans subject matter.	25,000.00
6. To strengthen the attention ability in emergency and natural and technological disasters related to the generation of dioxins and furans in emergency situations.	20,000.00
Action Plan – Awareness, Communication and Citizenship Participation	USD\$ 92,000.00
1. To strengthen the strategy of communication and awareness and education of the population about persistent organic pollutants (POPs) problem and the priorities established in the National Implementation Plan through the participation of the Ministry of Public Education, INA, Institutions of Higher Education, Professional Organization, NGOs among others.	50,000.00
2. To strengthen actions to place the National Implementation Plan subject matters for POPs reduction among key agents: ministries, academy, industrial, farm owners, and community organizations.	30,000.00
3. To promote and support the establishment of mechanisms to strengthen synergies with other programs and projects (example: Peace with Nature) for the awareness and informed and organized participation of the different sectors of society related to POPs management and the National Implementation Plan.	12,000.00
Total Budget	USD\$ 8,523,000.00