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Economic Commission for Latin America and the Caribbean

**REPORT ON THE NATIONAL SEMINAR ON WASTE MANAGEMENT FOR
SUSTAINABLE DEVELOPMENT**

**ANALYSIS OF EXPERIENCES AND CASE STUDY OF THE CITY OF
CARTAGENA, COLOMBIA**

(Cartagena, Colombia, 7-8 September 1992)

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Introduction

This report contains basic background information and a summary of the debates held during the national seminar on "Waste Management for Sustainable Development. Analysis of Experiences and Case Study of the City of Cartagena, Colombia".

The seminar was organized jointly by the Economic Commission for Latin America and the Caribbean (ECLAC) and the National Institute for Renewable Natural Resources and the Environment (INDERENA), through its Regional Office in Bolívar, with the support of the Oceanographic and Hydrographic Research Centre of the Colombian Navy (CIOH), which provided the meeting facilities.

The seminar was one of the activities organized with the Government of Colombia as part of the ECLAC/United Nations Environment Programme (UNEP) project entitled "Technical Cooperation for Environmental Planning and Management in Latin America and the Caribbean", which ECLAC is carrying out through the Joint ECLAC/UNEP Development and Environment Unit of the Environment and Human Settlements Division. Cartagena, Colombia, was selected as the subject of one of the case studies under this project.

A. ATTENDANCE AND ORGANIZATION OF WORK

1. Place, date and objectives of the national seminar

1. The national seminar on "Waste Management for Sustainable Development. Analysis of Experiences and Case Study of the City of Cartagena, Colombia" was held on 7 and 8 September in the city of Cartagena, Colombia, at the headquarters of the Oceanographic and Hydrographic Research Centre of the Colombian Navy (CIOH), which provided the meeting facilities and meeting support services.
2. The specific objectives of this seminar were:
 - a) To analyse and discuss the experiences of various Colombian cities in the field of waste management;
 - b) To discuss the potential for horizontal cooperation in order to improve urban and industrial waste management and lay the groundwork for international cooperation in those areas.

2. Attendance¹

3. Twenty-two professionals and experts from academic, private-sector and national and municipal government institutions concerned with the environment, participated. The cities represented at the seminar were: Barranquilla, Bucaramanga, Buenaventura, Cali, Cartagena, Ibagué and Medellín. Two ECLAC experts were also present.

3. Opening meeting

4. At the opening meeting, participants were welcomed by Vice Admiral Holdan Delgado Villamil, Commander of the Atlantic Naval Forces; participants were then addressed by Mr. Manuel Rodríguez, General Manager of INDERENA, who described the national environmental policy and the advanced status and main components of the project to establish a Ministry of the Environment. Lastly, Mr. Santiago Torres delivered a statement on behalf of ECLAC. He referred to the project ECLAC was carrying out in the region, which included the activities taking place in Cartagena. He also explained the objectives of the seminar and described the benefits that the participants' work was expected to yield.

¹ See the list of participants in annex 1.

4. Organization of work

5. The seminar conducted its work in plenary meetings. It opened with general and conceptual statements on waste management and policy tools, followed by presentations on the experiences in the cities represented. It concluded with a presentation on opportunities for international cooperation in the field of environmental management in general and waste management in particular, and for horizontal cooperation in those areas.

5. Agenda ²

6. The agenda contained the following items:

1. Opening ceremony
 - Statement by the Vice Admiral of the Navy
 - Statement by the General Manager of INDERENA
 - Statement by ECLAC representative
2. Current approaches to waste management in the light of international experience
 - a) General strategy. Leader: Mr. Hernán Durán, ECLAC expert
 - b) Mechanisms. Leader: Mr. Santiago Torres, ECLAC expert
3. Presentation of national experiences
 - a) Case study of Cartagena
 - Methodology used (ZOPP (project planning by objectives) seminar and inter-agency coordination)
 - Basic environmental management plan and its components
 - Current status, future plans and discussion of basic plan
 - b) Case studies of other cities: Barranquilla, Bucaramanaga, Buenaventura, Cali, Ibagué, Medellín
4. Horizontal and international cooperation
5. Closing of the seminar

² See the list of documents in annex 2.

B. SUMMARY OF STATEMENTS AND DEBATES

1. Current approaches to waste management in the light of international experience

a) General strategy

7. The ECLAC expert, Mr. Hernán Durán, described the state of the art in waste management economics and technology.

8. His presentation was divided into three main topics. First, he analysed the origin of urban and industrial waste and its economic life cycle. He then discussed the political evolution of the issue and the technological responses it had evoked: from indifference on the part of the public, whose main goal was to have sewage treatment plants, to the demand for clean technology, i.e., from an exogenous vision, to an endogenous vision consisting of modernization and industrial retrofitting with a sustainable change in production patterns. Third, he said that the primary objective was to minimize waste generation and, to that end, progress must be achieved simultaneously in five areas: education, human settlements, legislation, technology and the economy. The political response was therefore to develop each of those aspects as it related to the environment and, above all, to ensure that they interfaced.

b) Mechanisms

9. The ECLAC expert, Mr. Santiago Torres, outlined the chief mechanisms available for environmental management in general and waste management in particular.

10. He presented the economic tools by summarizing part of the contents of the document distributed to seminar participants.³

11. He also referred to regulatory instruments directly applied by the State, which were the most frequently used mechanisms in the region. Among them were quantitative restrictions on the use or exploitation of certain resources or ecosystems, such as quotas (on fish, hunting, mining, commerce); the granting of permits and licenses; the establishment of closed seasons (permanent, temporary, local); bans or restrictions on the use or exploitation of ecosystems (parks, reserves, sanctuaries) and the establishment of norms placing limits on wastewaters, gas emissions or solid waste disposal.

12. Other direct regulatory instruments were those that sought to control the use or exploitation of certain ecosystems or natural resources through certain practices or methods guaranteeing the proper protection of such ecosystems or natural resources. He mentioned zoning, including regulatory procedures that were frequently used in urban systems; permits to establish and conduct human activities which were normally subject to an environmental impact statement or assessment; and permits for exploitation or use subject to compliance with specific procedures for the management or control of potentially polluting substances.

³ See the list of documents in annex 2.

13. Lastly, he stressed that, since environmental problems were typically complex, one criterion in choosing the mechanisms to control them should be the need for a combination of complementary instruments to be determined on a case-by-case basis. The package should generally aim in several different directions: to make positive changes in how social agents perceived the environment and natural resources; to provide incentive for the social agents to develop more environmentally correct behaviour; to act directly on the environment by repairing damage already done or increasing the capacity of ecosystems to withstand various adversities; and to activate the positive influence of those social agents who had gained an awareness of the importance and necessity of ensuring environmentally sustainable development.

2. Presentation of national experiences

a) Case study of Cartagena

14. Mrs. María Eugenia Rolón, Regional Director of INDERENA, described the experience of Cartagena, Colombia, focusing primarily on the procedures and methods used to carry out the diagnostic study. She identified the main problems and outlined a basic plan for the environmental management of waste within the framework of the ECLAC/UNEP Project on Technical Cooperation for Environmental Planning and Management in Latin America and the Caribbean.

15. Since many studies had been done at various times in the past 10 to 15 years on the environmental problems of Cartagena, particularly with regard to water pollution, the diagnostic phase was confined to systematizing some of the information and pointing out any remaining information gaps.

16. Based on that systematization, a project planning by objectives (ZOPP) seminar was held, in which all the institutions of Cartagena either directly or indirectly concerned with environmental issues and waste management participated. As a result of the seminar, the basic elements of a master plan were defined. It included the main objectives and results that should be achieved by environmental management in Cartagena, which were incorporated into the Basic Plan (see document LC/R.1175, mentioned in annex 2). In the course of the exercise, it became clear that, in the end, the city's most serious waste management problem was its polluted bodies of water, caused by its industrial and port activity and the generation of household refuse. Soil pollution was also a serious problem because of inadequate collection and disposal of household solid waste, compounded by ignorance of how to treat and dispose of solid industrial waste. There was a clear consensus among seminar participants as to the local and specific nature of the air pollution problems.

17. Finally, based on the outcome of the seminar, work was done on drafting descriptions of projects to be carried out with a view to achieving the objectives and the results outlined in the master plan. The descriptions were done in conjunction with each of the concerned institutions in Cartagena, with technical assistance from ECLAC. The descriptions (nine in all) were the following: an environmental management plan for bodies of water that could be applied to the Bay of Cartagena, control of liquid industrial waste; the establishment and maintenance of a network to monitor water quality; a study for the collection and proper treatment of waste in the Port of Cartagena; the elimination of pathogenic waste from hospital centres; the study of a centralized, permanent disposal system for solid industrial waste; relocation of the population living in high-risk areas and rehabilitation of La Popa Hill; a study for the establishment of

a sanitary solid waste landfill; and a programme of strengthening institutions for environmental management in the District.

18. Javeriana University was conducting a series of studies and activities relating to the environmental management of Cartagena. An agreement had been reached whereby the University would collaborate in the subsequent phases of the project —particularly by doing an economic assessment of the various components of the Basic Waste Management Plan— which was of vital importance for the negotiation and granting of the financing necessary to implement it. The terms of reference for the study had already been elaborated.

19. Mr. Francisco González, Director of the Institute of Environmental Studies of Javeriana University, concluded the presentation on Cartagena with a brief report on the main findings of the University's study, which corroborated the main conclusions and recommendations contained in the Basic Plan.

20. The following points were brought out in the discussion of the case study of Cartagena:

- The lack of a consistent environmental policy in the District that could serve as a guide for general development management;
- The need and potential for motivating those sectors and agents who would stand to benefit from the implementation of an environmental plan like the one proposed to contribute to its successful negotiation and implementation (entrepreneurs in the tourism and services sector, for example);
- The importance of making a number of proposals and policies on environmental issues a national concern for, although they might require local solutions, they were of national significance. That would help provide greater continuity in the necessary activities;
- The need for better organization of various local agents, particularly with regard to the care and proper development of critical areas. The establishment of "foundations" to safeguard such areas (Islas del Rosario, for example) was suggested;
- The need to emphasize that the municipal level was particularly vital for proper environmental management and that a genuine commitment to implement the plan must therefore be obtained from the municipal authorities. In that connection the tremendous importance of strengthening institutions with a view to such management was also stressed.

b) Case studies of other cities

21. Barranquilla: The case study of the city of Barranquilla was presented by Mr. Luis Eduardo Forero, Chief of Planning for the Metropolitan Area of Boquilla. He began his presentation by showing a video-taped film depicting the seriousness of the environmental situation and the efforts being made by the current municipal administration to deal with it.

22. Referring to the environmental problems associated with streams and waterways, he proposed a programme for rehabilitating them with significant community input.

23. Referring to the issue of solid waste, he discussed the establishment of an inter-agency recycling committee that would oversee the restructuring of municipal sanitation, sewerage and water companies and the study of an integrated system for the Barranquilla area, in addition to a reduction in the volume of disposable trash. In that connection, mule-drawn carts were being used to collect household waste in areas that could not be reached by standard trucks. That implied, on the other hand, working in close cooperation with the community and, to some extent, the privatization of services.
24. The municipal authorities' strategy to deal with the potential impact of urban and industrial growth in terms of waste generation and disposal was predicated on a joint effort, based on a continuous, open dialogue with enterprises and other local and national agents.
25. One element that came out repeatedly in the case of Barranquilla was community participation, which set the tone for the municipal management programme as a whole. It included community diagnostic studies of the main problems of each group and encouraged people to organize through community action boards, citizens' committees and local administrative boards.
26. Bucaramanga: The case study of Bucaramanga was presented by Mr. Jairo Puente, Coordinator of the Municipal Environmental Research Unit. He began with a general statement about the problem of waste in Bucaramanga, in terms of both the pollution problems it created and from the perspective of the institutions seeking to ensure proper environmental management.
27. He stressed the seriousness of the problem of trihalide methane pollution from the chlorination of wastewater which, in Bucaramanga, was 10 times higher than the maximum concentration permitted by international standards.
28. He noted the importance of the integrated treatment of household solid waste, since sanitary landfills went only partway as a means of permanent disposal. Scavengers in garbage dumps played a legitimate role in recycling; their job, however, should be redefined, and they should be removed from the garbage dumps with a view to establishing cooperatives for house-to-house collection.
29. Buenaventura: The Mayor, Mr. Edison Delgado Ruiz, presented the case study of the city of Buenaventura. To a large extent, the origin of the city's main environmental problems could be traced to its historic process of spatial development. The urban sprawl of Buenaventura lengthwise towards the port zones along the main highway had caused major difficulties in the consignment of garbage, the construction and coverage of sewerage facilities and the provision of other urban services.
30. The city produced around 92 tons of garbage daily. The fact that the population was not well educated about waste management, would have tremendous implications for the success of any programme designed to resolve the problems of urban refuse. Under a work programme being formulated, committees would be formed all over the city to set up "recycling sites", around which recycling enterprises could be organized.
31. Notwithstanding any progress achieved in recycling, it was becoming urgent to streamline the permanent disposal system. To a large extent, garbage was discarded in low tide zones which then became landfills, on which human settlements sprang up, bringing with them all the usual sanitary and security problems.

32. With regard to basic sanitation, he referred to a master sewerage plan which would include, inter alia, the treatment of liquid waste prior to disposal, to be administered by INDERENA.
33. It should also be noted that the Pacific was one of the most biologically diverse areas in the world and was therefore the heritage of mankind. An international loan was being negotiated in order to finance the preservation of designated areas. At the same time, the proposal and implementation of measures that would provide alternative means of subsistence to sizeable groups of the poor were under consideration.
34. Cali: The presentation on the experience in the city of Cali was delivered by Mr. Diego Velásquez Noreña, Assistant Technical Manager of the Municipal Services Corporation.
35. Efforts in the area of solid waste management, treatment and disposal must be redoubled; he noted however, a number of proposed projects that were moving in that direction. Thus while the lack of resources clearly ruled out the construction and installation of incineration facilities to dispose of hospital refuse which totalled approximately 7.5 tons, it did seem feasible to install a central incinerator to service all hospital centres and clinics, under a financing arrangement in which it would be provided in exchange for services. In addition to an incinerator, the establishment of a safe sanitary landfill was proposed.
36. In that connection, he also stressed that Cali had been a pilot city in the recycling effort; the funds it generated were earmarked for recreational activities. Essentially, the operation was based on the premise of "non garbage" —since 75% of the garbage generated was organic material and the other 25% consisted of other materials such as paper, plastic and scrap metal— in the knowledge that, from an economic standpoint, only the recycling of scrap metal was cost-effective.
37. One alternative being studied for organic trash, was earthworm breeding, which looked promising despite an accident that had recently occurred, killing around 10 tons of worms. Another alternative being considered was composting, employing manual processes, with a proven average yield of approximately 20% (10 tons of trash produced 2 tons of compost).
38. The problems surrounding the permanent disposal of hazardous industrial waste were also acknowledged in that connection, an abandoned pit that could be adapted as a safe disposal site was being sought.
39. Another area being addressed was the disposal of waste from the spoil of various public works projects. Controls had been established over the disposal of waste in green areas. When large producers of spoil were granted planning licenses, they were requested to consign and properly dispose of it. In the case of small producers of spoil, a payment strategy had been worked out for consignment services to the specified disposal site, so that the task of urban sanitation did not become too unwieldy.
40. Concerning the problems of household garbage collection, particularly in areas that were densely populated by low-income communities (Aguas Blancas, for example), collection micro-enterprises had been established that used manually-operated equipment and stationary intermediate collection points, making it possible to ensure nearly 90% collection coverage.
41. In conclusion, a feasibility study was being done on recovering methane gas from the sanitary landfill in which, 3 million cubic metres of garbage had already accumulated. A Canadian company had expressed interest in the project and its use in the generation of electric power, which would be distributed through an interconnection system.

42. **Ibagué:** The Ibagué experience was presented by Mr. Rubén Darfo Rodríguez, Mayor. He noted aspects of municipal development management that had been achieved with technical assistance provided by ECLAC as part of the project on Urban Management in Selected Medium-sized Cities of Latin America.
43. **Medellín:** The Medellín experience was presented by Mr. Juan Guillermo Valderrama Gómez, Chief of Permanent Disposal, Empresas Varias de Medellín (a municipal public service corporation).
44. The tasks of waste management were divided between the public enterprises responsible for water supply, sewerage and other urban services and Empresas Varias, which was responsible for managing refuse from the slaughterhouse and the marketplaces.
45. Referring to liquid waste management, he said that sewerage services were currently being provided to around 85% of the population of Medellín. An integral programme of cleaning up the Medellín River, which would include, *inter alia*, the construction of intercepting sewers and two or three wastewater treatment plants was being studied; at the same time, there were plans to survey all industries in order to determine precisely how much of each pollutant they generated, to monitor dumping more effectively and to revise the scale of fines.
46. There were various problems with the system of household garbage collection. They ranged from the inability to provide the necessary vehicles for the system (approximately 80% of the current fleet was obsolete and, owing to administrative problems, the bid for 20 garbage trucks had to be declared void), to the difficulties in maintaining collection routes (each route could last 9-10 hours because of the time it took to sort the material on the way and because of detours from the prescribed route in order to sell scrap metal and recycling material).
47. Until 1982, the permanent disposal site was an open garbage dump. Since that time, a sanitary landfill had been used. He showed an informative and interesting video-taped film portraying the experience of Medellín in that area. One outstanding aspect was the solution offered to persons who lived by scavenging trash. They were organized into cooperatives specializing in waste management, recycling and clean-up, which provided services such as cleaning public bathrooms and acting as clean-up crews at various events.

3. Horizontal and international cooperation

48. The topic was introduced by Mr. Hernán Durán, the ECLAC expert. He stressed the importance of all aspects of disseminating technology, both in terms of avoiding the repetition of mistakes made by nations that had been leaders in technology, and in terms of avoiding the reproduction of technological schemes without properly adapting them to the environment in which they were to be applied.
49. Referring to some of the specific aspects of international technological cooperation in the field of waste management, he stressed that the composition of waste in Latin America and the Caribbean was very different from what it was in Europe, the United States and other industrialized nations. Much of the recycling technology transferred thus turned out to be unsuitable. There was a higher proportion of organic material in Latin American and Caribbean waste, which made its economic value as a source of recyclable inputs much lower and, therefore cast doubts upon the feasibility of establishing

high-technology recycling plants. That also meant that the caloric value of waste was lower, which, in turn, reduced the feasibility of using it as a source of energy by combustion. In that respect, international cooperation in the field should be carefully appraised on the assumption that, in most cases, the right solution was likely to be a combination of technology and low-automation systems that balanced recycling with incineration and disposal in sanitary landfills.

50. ECLAC could serve as a conduit for support in the field of international cooperation. Although it was not a financing agency, it could provide technical assistance and support services for the establishment of liaisons with other international institutions. For example, the Pan-American Centre for Sanitary Engineering and Environmental Sciences (CEPIS) had experience in waste lagoons and technical systems of waste management and control; UNEP, through its offices in Paris, Nairobi and Mexico City could receive inquiries and refer complaints; and ECLAC, could cooperate and sponsor countries' applications to financing agencies such as the World Bank and the Inter-American Development Bank (IDB).

51. Concerning horizontal cooperation at the national level, seminar participants agreed that the actual experience recounted in the seminar seemed to indicate that the establishment of some non-bureaucratic mechanism—something on the order of a network—among the institutions concerned with waste management in the various cities, would result in significant overall progress.

52. The following points were specifically brought up in that connection:

- INDERENA should be included in the effort to set up a horizontal cooperation network through the establishment of some mechanism to be studied;
- A support project for cooperative research in the field of waste management should be formulated;
- A means of ensuring the regular flow of information on specific aspects of waste management should be sought. Information that could help to determine the kind of waste generated by different types of industry and that could identify and provide details on successful experiences would be of more immediate use;
- Lastly, an interesting alternative in relation to human resources training might be to offer "internships" for officials at places and institutions that had been successful, both in their own country and in other countries of the region.

C. CLOSING OF THE SEMINAR

53. The seminar concluded with brief statements by the Regional Director of INDERENA, Mrs. María Eugenia Rolón, and by the ECLAC representative, Mr. Santiago Torres, who thanked the representatives of the selected cities, the universities and the private sector for participating in the event.

Annex 1

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LIST OF DOCUMENTS

<u>Symbol</u>	<u>Title</u>
LC/R.1175	Basic Plan for the Environmental Management of the District of Cartagena, Colombia
LC/R.1138	Instrumentos económicos para la política ambiental: documentos seleccionados