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The Environmental Situation in Cuba

TRANSITION



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The Environmental Situation in Cuba

1. INTRODUCTION

Since 1959, the work of the Cuban system on environmental education and protection has been characterised by the extensive institutionalisation and centralisation of these activities. This tendency has had positive effects in terms of its scope, and pyramid structure that encompasses the entire spectrum, from central (national) bodies to the localities. Nevertheless, a critical look at this system reveals that it has, on many occasions, been a redundant model, and, more worryingly, in practice, autonomous activities by the citizens are not given a place within its structure.

This is why it is important to understand that although some cases of environmental activism do appear in this report, these are exceptions to the rule. In general, the Cuban population has assumed a passive attitude towards the environment, which is a result of State propaganda, defined by a patronising and didactic discourse that is always self-congratulatory of the national situation, and extremely critical of foreigners (unless they are from allied nations).

On the other hand, Cuba's scientific institutions, in the service of the State, as part of programmes and organisations that are not connected to the communities, have shown themselves to be insufficient for the protection of the environment on the island. Aggressive agro-forestry and energy programmes are being developed in the country, while the few environmentalists remain disconnected from each other, complaining about the State machinery that is implementing development programmes without consultation.

Nevertheless, it must be said that, from an institutional perspective, the Ministry of Science, Technology and the Environment has developed Environmental Education policies that, although they are ineffective, provide access to some very useful studies and research. See Annex 6.1 for an edited list of multimedia resources with educational themes produced at a State level. In Annex 6.2 you can also see the titles of the pamphlets in the Educational Series "Protect your family from ...", which covers different issues. Of course, these pamphlets cannot actually be found anywhere, people are not aware of them and therefore do not read them. There are also a number of scientific journal dealing with environmental issues, edited by State institutions, that are worth highlighting (Annex 6.3).

The Cuban education system has a "National Environmental Education Strategy". This is a key document that, like many others, represents a valuable contribution on the issue, but the application of which is, in practice, almost non-existent. Getting the environmental dimension into the curriculum and incorporating it into disciplines is a problem that the system has recognised for many years, particularly in post-secondary education, and in teacher training.

Contrary to the guiding principles, in practice, primary, mid-school and secondary education, offers an excessively didactic focus, encouraging student to "love" nature as an external and abstract thing. There are no concise and/or interdisciplinary perspectives on the environment. Thus Cuban flora and fauna are sugar-

coated and disassociated from the political and economic realities in which they exist. Of course, this practice of demonstrating nature's beauty goes hand in hand with the traditional apologist discourse that stresses the benign environmental situation in Cuba, and doesn't offer a single criticism of the difficulties that Cuban ecosystems face. If it is necessary to speak of the contamination of rivers and seas, or air pollution, or deforestation, it is done using foreign images, never images from the national reality.

In university settings, the environmental dimension has begun to be introduced, to some extent, in those degrees and disciplines the study objectives of which are linked to environmental issues (such as the biological and chemical sciences). However, it is associated with research related to essential natural resources, being developed by a handful of professors and it cannot be considered a priority of institutional policy.¹

At this level, the vision of nature is dominated by utilitarian ends. Not even the Biology Faculty of Havana, where the ecologists who will go on to work to defend nature are trained, promotes ecological thinking or sensitivities. Ecology or environmentalism is seen as a *petit bourgeois* fad, a luxury that rich and capitalist countries can allow themselves (and use to assuage their supposed guilt over being the planet's principal predators). The aim of science is to meet human expectations for development; it is not conceived as having a position of respect for nature *per se*.

It is nevertheless significant that this issue has emerged among the students of the Higher Institute of Industrial Design (ISDI by its Spanish initials), which would seem far from any ecological forms of thinking, yet each year they present their thesis in the form of design solutions for local environmental challenges. These solutions are not implemented, but it is an area of unexplored potential.

Finally, having passed through around 15 years of the Cuban education system, students leave without any awareness of the principal environmental challenges facing their country; much less the feeling of being part of the necessary solution.

The crisis of the 1990s led to a small increase in the opening for supporting associations on the island, leading to the emergence of some Cuban environmental NGOs; the participation of some foreign ones; and the development of projects for social and community involvement that, somewhat superficially, deal with the ecological problems proliferating in Cuba.

This is another reason why the Cuban public is not entirely unaware of environmental issues, particularly those problems that affect people directly: the treatment of waste, access to fresh drinking water, the shortage of rainfall, noise and air pollution in urban areas, among others. Specifically, the issue of garbage in the streets is something that often appears on national TV and in the electoral programmes of Delegates to the National Assembly of People's Power.

The Cuban public is not indifferent, and indeed even has a certain awareness of these issues. Although, in practice this never translates into concrete actions or environmental protection. It is therefore not so absurd to consider the possibility of encouraging people to get involved in ecological initiatives.

¹ Ramírez Zaldueño María Teresa. THESIS: Sistema de Tareas para contribuir a la Educación Ambientalista mediante la asignatura Métodos Químicos de Análisis. Holguín, 2003.

In fact, the way in which the Cuban system comprehends (at least in theory) “Environmental Rights”, is, to our mind, extremely favourable.

1.1 Principles of Environmental Law in Cuba²

- The enjoyment of a healthy environment is a fundamental right of all men and women.
- The conservation of the environment is a duty of all natural persons and legal entities.
- Faced with the risk of serious and irreversible damage to the environment, the priority is prevention. The lack of absolute scientific certainty cannot be claimed as a reason to stop the adoption of preventative measures.
- It is the right of every citizen to have access to available information about the environment.
- The environmental dimension should be taken into account in all development strategies, programmes and plans.
- Environmental education should have a concise and interdisciplinary focus, aimed at all social sectors and age groups, with a special emphasis on decision makers and children, adolescents and young people.
- Environmental management should involve all organs and bodies, public and private and social and citizen's organisations.
- It is obligatory that the public be aware and the citizenry consulted over decisions and actions that, in one way or another, will affect the environment.
- It is the right of every citizen to rely on the possibilities and appropriate legal mechanisms that allow them to activate legal or administrative mechanisms in order to enforce compliance with the law and other mandatory regulations in terms of the environment.

Apart from this, Cuba is today part of more than 90 conventional and non-conventional international, global, regional and bilateral treaties. When a country forms part of a treaty or international agreement, that agreement becomes part of the country's internal law, and takes prevalence over national law. In accordance with the current Civil Code: “If an agreement or international treaty of which Cuba forms part establishes rules different from those expressed in the preceding articles or not contained in them, the rules of said agreement or treaty will be applied”.

1.2 The Cuba of today is not the Czech Republic of 1989

It is evident that, in practice, things function differently today. Here is a brief comparison between the environmental situation in the Czech Republic at the time of the transition, and the current situation in Cuba:

² Derecho Ambiental Cubano. Multiple authors. Habana, 2000.

Czech Republic 1989 ³	Cuba 2015
Essentially technical regulations that were not even respected	A strong framework of quite diverse regulations. A large part of which are discretionarily applied; the government always has the prerogative to violate them. These regulations do not respond to the needs of the new socio-economic panorama of the island, with a high likelihood of penetration by foreign capital.
There was no Ministry of the Environment	In 1994 the Ministry of Science, Technology and the Environment (CITMA, by its Spanish initials) was created, with a series of subordinate Agencies and Institutes. Among these the Environment Agency stands out, but it is also worth mentioning Centres such as those for: Environmental Management, Inspection and Control, the Dissemination of Information and Environmental Education, Protected Areas, Biodiversity and Biological Security.
No official information or public control	Very little official information. Generally speaking, CITMA does not provide information directly to the public or to the official press. There are libraries and information centres in most institutions, however, access to these is often limited to researchers in the sector, and the information is very technical, and difficult reading for non-specialist, civil society activists or interested individuals. One positive aspect is the emergence of the National Office for Statistics and Information ⁴ , with free access via the national Intranet, which offers some information, although it is important to be aware of the serious limitations to the credibility of statistics on the island, due to the vested interest in offering an idyllic image of a country that respects nature.
Official and independent civil movements (scientists, students, intellectuals)	There are no real social movements on the island, due to a social design that moves further every day from social inclusion, sometimes even bordering on illegality, and which threatens the rights of individuals and their capacity for self-organisation. Nevertheless, it is possible to speak of civil initiatives, which almost always have a powerful state element, and involve children and young people in environmental activities. Members of the scientific community have taken positions that differ from the state line, on issues such as the release of genetically modified crops on arable land. Lastly, a few NGOs exist that are working on environmental issues.
Persecution of the signatories of petitions	Petitions of this sort are not common. Nevertheless, environmental issues are not considered to be a "problem" by the Cuban authorities. Rather than condemning any autonomous initiatives, the systems try to recuperate them for its own ends, and channel them it into its inoperative bureaucratic processes.
Industrialised country	Cuba is a semi-industrialised country, in which the environmental problems faced are of a different sort. One of the principal "industries" is tourism, which has had a profound environmental impact, above all on coastal ecosystems. Another industry which is not very extensive, but which has a significant impact, is mining. Cuba is, today, one of the top ten producers of nickel and cobalt, and also produces copper and gold in smaller quantities.
Environmental issues were among people's highest	The environment is not a priority for the Cuban population or for almost any of the opposition groups, with some rare exceptions.

³ Conference "Environmental policy and politics in CR after the Velvet Revolution", given by Daniel Vondrouš, Green Circle, Prague 2015.

⁴ www.onei.cu

priorities.

The overall level of development of ecological thinking at the end of the 1980s was not the same as it is today, and that should also be considered a differentiating factor. Furthermore, in order to insert itself into the global system, Cuba has had to assimilate various practices and international instruments that demand a minimum of environmental guarantees, in order to enjoy other benefits.

2. THE TREATMENT OF SOLID WASTE

2.1 Environmental Laws

National Environmental Strategy

The National Environmental Strategy (NES)⁵ 2011-2015, in characterising the principal environmental problems at a national level, points to the “Deterioration of sanitation and the environmental conditions in human settlements” as one of the principal problems facing the island, and, among others, it refers to the following issues:

- The collection and disposal of solid waste can be seen to be seriously affected due to serious limitations in the automobile fleet and the availability of depots for garbage collection; there is a proliferation of illegal dumping in inhabited areas and inside boarding schools and workers’ or school camps in the countryside. There are also problems with hygienic and sanitary conditions, inadequate protection and operation of landfill sites, and the inadequate collection and disposal of hospital waste, which on many occasions is collected together with domestic waste, constituting a health risk. The difficulties faced in the collection of solid waste and the increased presence of domestic and farm animals in homes has led to the proliferation of vectors; this is inextricably linked to a lack of social discipline and the deficient application of existing laws, which favours the accumulation of waste in densely populated areas.
- The majority of the installations that deal with dangerous waste do not provide safe treatment and disposal, there are deficiencies in the qualitative and quantitative inventory of this waste, and in the work done to reduce, reuse, recycle and maximise efficiency in the use of raw materials and waste management. The rational environmental handling of toxic chemical products throughout their processing cycle also poses significant difficulties.

The NES itself recommends:

“Adequate finance and improved organisation in the collection and disposal of solid waste, which constitutes one of the principal problems in the bigger cities, and which brings with it the uncontrolled appearance of disease vectors and serious hygiene and health problems. It is therefore necessary to provide community

⁵ Estrategia Ambiental Nacional (National Environment Strategy) 2011-2015. Guiding document for the Ministry of Science, Technology and the Environment. p. 10.

service resources in the territories in order to achieve a substantial improvement to services; and energetic efforts to tackle the lack of social discipline and insufficiencies in the effective application of existing laws; whilst at the same time implementing systematic efforts to create environmental awareness among the population”.

The Environment Law

Another extremely important piece of legislation is the Cuban Environment Law: Law 33 from 10 January 1981 “On the Protection of the Environment and the Rational Use of Natural Resources”. In a number of articles of this law, it is possible to identify the Cuban system's commitment, at least formally, to dealing with environmental rights. See the summary of the Environment Law in Annex 6.4.

Law 1288/1975

Furthermore, the Law 1288/1975 is a specific body of laws designed to guarantee waste collection in the State sector. However, to date, the lack of compliance with this law has prevented opportune and effective recycling.

This law establishes the obligation of State companies to classify recyclable waste at the source, safeguard its protection and ensure that it is delivered to the companies responsible for recovering raw materials. Each year more than 400 inspections take place to ensure that the State bodies subordinate to the different bodies of the Central State Administration and the Provincial Administrative Councils are complying with the legal regulations. Most of these companies obtain deficient results. See the summary of the articles of this Law in Annex 6.5.

As you can see, this law is completely out of date, as it dates back to 1975 and makes reference to bodies and organisations that no longer exist, and therefore cannot carry out the tasks attributed to them under this law. Furthermore, the way in which the Cuban economy is currently organised bears no relation to how it was organised in the era to which the law refers.

2.2 Cuban institutions responsible for waste collection

The Ministry of Industry, the Ministry of Public Health, the Ministry of Science, Technology and the Environment, the Institute for Physical Planning, and the Ministry of Construction, among other bodies, share responsibility for the treatment of waste. Nevertheless, it is the Union of Enterprises for the Recovery of Raw Materials, the State body responsible for the recovery, processing and commercialisation of recyclable waste produced in both the residential and State sectors (in the spheres of production, commerce and service provision). These materials include: scrap steel, cast iron, aluminium, copper, zinc, lead, nickel, waste and scraps of precious metals, paper, and cardboard, glass and plastic containers, textiles, and plastic waste.

Companies that make up the group:

- DESEQUIP. Company for the Dismantling of Equipment
- CUREF S.A. Recycling
- FUSA. Metal and Wood Production
- Company for Repairs and Dismantling
- Transport Company
- Service and Insurance Company

- The Explosives Enterprise
- FUNALCO. Smelting Company "Hermanos Ruiz Aboy"

Furthermore, in each province there is a local company undertaking these activities in the territory, that is responsible for the recovery, processing and commercialisation of recyclable waste generated in the residential and State sectors.

The organisation currently employs more than 7 000 workers in 25 companies throughout the country, but these tasks are also carried out by 5 800 self-employed workers, and that figure is increasing as part of a process of reorganizing labour that seeks to reduce the number of state workers and create private and cooperative forms of management.

The legal routes used for the recovery of recyclable waste in the country are:

A) Through purchase contracts between provincial recovery companies and the State companies obliged by law to deliver waste that they are not going to reuse themselves for recycling. By this route, companies deliver the already classified materials to the Provincial Raw Materials Enterprise for recycling.

B) Through raw material shops that purchase direct from the population. These make up a network of 312 establishments that annually receive more than a million sellers. These shops currently collect the waste controlled by the community, in the hands of the self-employed waste pickers and the recently created recycling cooperatives. The waste pickers themselves carry the waste they collect directly from the landfill sites, illegal dumps, private and public garbage containers, and from the companies that don't recycle their waste. This waste is weighed and paid according to a price list based on supply and demand.

C) The so-called Pioneer Movement Recyclers of the Future, tries to educate children in the economic and environmental importance of this activity. The teachers take the children out into the community to collect materials (basically glass bottles and cardboard). These are occasional, one-off activities.

D) The small scale Raw Material Collection Festivals organised by the Committees for the Defence of the Revolution (a semi-state community institution), which take place only on dates selected and previously organised together with this organisation. As with point C, these are very occasional activities, and the people who participate receive no remuneration.

Routes A and B make the most significant contribution to the total volume of waste recovered (35 and 64 percent respectively⁶), while routes C and D contribute less than 1% of what is received annually. They are failed mechanisms, that belong to a dysfunctional and institutional logic, and are essentially propaganda exercises by the system in order to create an international image of popular participation.

⁶ Speech by the top management of the Union of Companies for the Recovery of Raw Materials on national TV on 26th June 2013.

See Annex 6.6 for a list of items the receipt of which is prohibited in this system “With the aim of avoiding vandalism against products that serve an economic or social function”

The upshot of this system is that ordinary people in Cuba do not undertake the separation of paper, plastic, glass, or organic waste. Garbage collection is a function of the State Waste Management Enterprise, Comunales, and it does so by mixing all kinds of waste together. The mechanism used is different in different areas, but this waste is not destined for recycling. It goes to landfills, where it is deposited, buried and the other part is probably incinerated, although we don't have proof that this is happening.

In 2008 a biogas plant was set up (creating a mix of methane and carbon dioxide) at the 100th Street Landfill Site, the largest in the country, in order to produce electricity from the processing of organic waste. The plant will allow the processing of between 15 and 20 tonnes of solid organic waste per day; and each tonne will produce between 30 and 40 cubic metres of gas. The plant uses German technology, and is the product of a United Nations Industrial Development Organisation cooperation, and received financial support from the Swiss government.

The 100th Street open-cast landfill site is 104 hectares and receives 80% of the garbage produced by the two million inhabitants of the capital. It has been operating for decades using out of date technology and creating a huge amount of contamination to the surrounding area (even polluting the city's main river, the Almendares). Sixty per cent of the waste is organic, but it must be separated on site and then passed through a shredder, from there to a hydrolysis tank and then on to be fermented.

According to our own research, in the beginning it used waste collected by the State Forestry Service, following the pruning and felling of trees in the city, never domestic organic waste. In personal interviews with illegal waste pickers on the 100th Street Landfill site, they say they have not seen activity at the biogas plant for a long time.

In fact, of the six bulldozers that the installation has, only one is working, neither of the two garbage compactors is working. Garbage accumulates and cannot be completely covered, while the spread of fires can barely be contained⁷.

This year work began on the Eastern landfill (at the entrance to the municipality of Cotorro), while the Western landfill site is still only a project. It is not clear whether it will include the installation of incinerators.

It is not a priority task, and Comunales lacks important resources to be able to properly carry out its functions, for example, they do not have the number of trucks they need. This is why they receive support from other organisations, which provide trucks every night, and at weekends they add loaders, which enables the largest amount of waste to be taken away from the cities, particularly rubble. Comunales hires workers from the prisons for sanitation jobs.

In a number of places, particularly outside Havana, local solutions are sought for garbage collection which may be associated with self-employed workers using animal drawn vehicles, or other forms of waste management,

⁷ <https://www.cubanet.org/noticias/el-basurero-de-la-habana-vertedero-de-las-miserias/>

as the local governments outside Havana have even less financial and technical resources at their disposal for these tasks.

In some places outside the capital there is talk of the existence of bio-digesters, within small communities, farms or cooperatives. During 2014 the figure for these reached 1052.⁸

In summary, solid waste is collected using three fundamental techniques: "specialised" collection, using trucks with mechanisms that tip the garbage containers in order to empty their content into the hopper; "conventional" collection, using tipper trucks and tractors with front loaders, that collect the waste thrown outside the garbage container and operate in urban areas that don't have assigned containers; and "animal drawn vehicles", used in rural areas.

The country suffers from a lack of garbage containers, meaning that in many areas the neighbours just leave their waste on any corner. In the capital, for example, they aspire to reach the figure of 9380 garbage containers before the end of 2015.⁹ Havana, with its more than two million inhabitants, generates on average around 20 thousand cubic meters of solid waste¹⁰.

Principal obstacles to recycling

- There is no appropriate infrastructure for classification at the point of origin.
- Low or zero technical capabilities of the equipment necessary for recycling (garbage containers, etc....).
- Insufficient logistics to deal with widely dispersed sources generating waste.
- The lack of a specific law on recycling and an overall legal framework that is out of date.
- Failure of State organisations to comply with the Law 1288.
- Organizations do not keep delivery records for the recyclable waste that they generate.
- The contracts between the parties are not updated, there is a lack of monitoring of compliance with the agreed clauses and of legal claims made for failure to comply.
- The majority of organisations do not have specific staff trained to carry out the work of garbage collection.
- There is no reliable statistical information on the generation of recyclable waste.
- Processes for the approval of retiring unused technical equipment are slow.
- There are not enough shops for direct purchase from the population and the services they offer can be sporadic.
- The existing financial scheme does not provide sufficient guarantees.

⁸ "Dispositivos generadores de energía renovable y biomasa empleada como combustible". Statistical Annual of Cuba 2014. 2015 Edition. National Office of Statistics and Information (Oficina Nacional de Estadística e Información).

⁹ <http://www.granma.cu/cartas/2015-07-24/sobre-vertederos-municipales-informa-comunales-de-la-habana>

¹⁰ Average calculated based on the table "Volume of solid waste collected by province". Statistical Annual of Cuba 2014. 2015 Edition. National Office of Statistics and Information (Oficina Nacional de Estadística e Información).

- There is no pricing policy to ensure parity with international markets, and the legal regulations for fixing and applying prices does not stimulate activity. There is no uniformity of prices and purchase prices for some recyclable material differ between the population and the state sector.
- Lack of compliance with technical regulations for the conservation and reconditioning of recyclable waste.

2.3 Recycling in Cuba

In Cuba we don't recycle waste as this is understood in other parts of the world. Nevertheless, there is a culture of saving and re-use which could be understood as exercises linked to recycling. It is common for houses to repeatedly reuse plastic bags, and they are only finally used as garbage containers when they are already broken. The same is the case for many other objects, usually plastics, which are globally considered to be "disposable", for Cubans they are reusable. Glass jars remain in houses for years, being put to multiple uses.

Of course, this is a result of precarious nature of the economy, and not environmental awareness. Just as the government's recycling policy is based on a productivist and mercantile logic, even though some documents talk about the environmental scope of recycling.

Recycling and the new economic policy in Cuba

The Guidelines of the Economic and Social Policy of the Party and the Revolution, approved in April 2011 during the sixth congress of the PCC, in its seventh chapter, which refers to industrial and energy policy, includes the following proposals:

- Guideline 232: Develop industries for the production of packaging materials and containers on the basis of a comprehensive approach for this activity. Priority shall be given to the production of the containers required for Cuban exports and agricultural development.
- Guideline 235: Promote recycling operations and increase the added value of recycled products. Prioritize the activities that generate the strongest economic impact with the least use of resources, as well as recapitalization, subject to economic possibilities.

This is why, in 2012, a new policy was designed in this area of waste management and recycling. This policy is already running, and will be reviewed in 2016, and it is supposedly going to be reinforced with the coming into force of a new Recycling Law. The draft of which is still in the research phase and has not yet been presented.

The process of implementing the new policy

The policy approved in 2012 aims to maximise the use of recyclable materials in national industry, exporting those materials where in-country use is technologically impossible. It is based on 6 fundamental elements:

1. Concentrate State Recycling activities on the major sources that generate raw materials and industrial processing. Implement new management models for recovery from small and medium-sized sources (Renting premises for purchase shops and three-wheeled motor vehicles to self-employed waste pickers collecting raw materials, and the creation of new recycling cooperatives).

2. Application of a closed finance scheme for recycling activities that will allow the use of 0.32 cents per CUC¹¹ coming in under the concept of exports. This offers the opportunity of financial resources for the purchase of the goods necessary for developing this industry.
3. Establishing a pricing policy that enables the application of stimulating prices for the purchase of recyclable waste both in the state sector and from the population at large and that adjusts prices for the sale of these raw materials to those of the international market.
4. The implementation of a new Recycling Law that, among other things, will establish the responsibilities of both natural persons and legal entities for recycling and define penalties for failure to comply with these.
5. Introduce the importance of recycling to teaching programmes at all levels of education as a way of increasing the culture of recycling among new generations, and the use of the mass media to generally inform the population on this issue.
6. Define a development strategy and an investment programme in the short, medium and long term that strengthens the recycling industry.

The principles of this new state concept of development in the Recycling sector can be summarised by the following processes:

- Selective classification at the point of origin.
- Compacting at the point of origin, depending on the product, reducing the transported volume.
- Large, and strong, medium-sized projects to organise collection cycles.
- Transportation in specialised tipping equipment, compactors with greater load capacity and a sustained increase in the role of rail transportation.
- Increase the processing of urban solid waste.
- Permanent ongoing territorial studies of the circulation and generating potential of the country's recyclable products, that enable the appropriate use of technologies and their organization according to the tendencies shown by these analyses.
- The application of new technologies that enable a sustainable industrialisation of processing.

In summary, the programme seeks to concentrate the activities of the State companies on major sources of waste for industrial processing, working to attract the participation of foreign capital with the aim of creating new recycling capabilities. This leaves a broad field of potential sources of recycling, from medium-sized and small generators of recyclable materials, free for exploitation.

What is interesting is that this is due, above all to the fact they are widely dispersed, leading to an inability of the State to provide an efficient system for collection. This is where a space opens up for the involvement of new economic actors, and possible tasks are created for a responsible citizenry that is sensitive to the importance of recycling.

The new pricing policy has been approved and has begun to stimulate activity on the part of both those who generate the waste and the waste pickers. The aim of the State is to get these prices closer to the prices that

¹¹ A double currency system functions in Cuba. The CUP or Cuban peso is equivalent to a Czech crown, whereas the CUC is the strong currency and is equivalent to the US Dollar. Exchange rate: 1 CUC= 24 CUP.

operate at an international level, however, for the moment, there are still vast differences. The Cuban State pays individual waste pickers \$8 pesos (the Cuban peso, or CUP, is equivalent to the Czech crown) per kilogram for aluminium cans, while, on average a kilo of scrap metal is paid at 2.24USD¹². As you can see, the profit margin for the State is considerable, whilst the sector of the population that carries out these functions remains one of society's most marginalised groups, with the lowest incomes, and often living outside of the island's Social Security system.

Nevertheless, the precarious nature of life on the island is such that these low prices have been enough to create an increase in the number of waste pickers.

The handling by companies of the recovery of raw materials began to show mildly encouraging results from 2013 onwards, with sales of just over 160 million CUC in recyclable waste. Of these, 55 million correspond to exports. This year 439 500 tonnes of recyclable waste were sold, representing 4 500 tonnes more than those commercialised in 2012, and the highest figure in the past 10 years.¹³

It is also useful to know that some materials are prioritised in the work of recycling on the island. In Cuba, non-metallic waste such as paper and cardboard are supplied to the paper companies for the production of school books, toilet paper, egg boxes, and tiles for homes, among other uses. Textile packaging, as well as glass jars and bottles, are also prioritised and grown to include more than 75 million units of different sorts annually.

In 2013 Cuba acquired a new plastics plant, located in the province of Cienfuegos which enables the recovery of some types of plastic which were previously impossible to recycle to a high enough quality to meet the requirements for export.

Plastic waste has also begun to be processed by a Non-Farming Cooperative in the Municipality of Fomento, Sancti Spíritus Province, which is dedicated to the production and commercialisation of plastic elements for national consumption. This small scale industry employs 10 workers and produces hoses, electric tubing, pipes, and attachments for agricultural irrigation systems among other products. This small company realizes annual profits of 2 million pesos (CUP) and contributes half a million pesos to the State budget, as well as recycling more than 20 tonnes of plastic per month.¹⁴

Unlike the two other Cooperatives for the Recovery of Raw Materials, set up by the State in Artemisa and San José de Las Lajas, which buy waste both from the state sector and from the population at prices driven by supply and demand; the plastics Cooperative in Fomento cannot buy directly from the population.

Among the products recycled we find more than 300 thousand tonnes of scrap iron, destined for the metal works, for the production of rebar and epoxy steel and its derivatives. Non-ferrous waste metals such as

¹² According to data on International Scrap Metal Prices:
<http://www.recycleinme.com/scrapresources/pricehome.aspx> 26/11/2015

¹³ José E Sánchez Abreu (2015): "El reciclaje de los residuos plásticos y sus oportunidades para Cuba", Revista Caribeña de Ciencias Sociales (April 2015). En línea: <http://xn--caribea-9za.eumed.net/2015/04/reciclaje.html>

¹⁴ Communique by Pavel Sanchez Zerquera, member of the "La Esperanza" ("Hope") non-Farming Cooperative in the municipality of Fomento, Sancti Spíritus; in: <http://xn--caribea-9za.eumed.net/2015/04/reciclaje.html>

copper, bronze, stainless steel, lead and aluminium are also commercially available to both national industry and for export, providing an annual income of more than 50 million dollars. However, without a doubt, the principal destination of Cuban scrap metal is export, with Spain being the main buyer, paying 12 million dollars per year in 2013 and 2014¹⁵. In 2014 this country also received from Cuba:

- Scrap aluminium: \$5.15 million
- Scrap copper: \$9.39 million
- Scrap lead: \$459 thousand
- Waste: \$236 thousand
- Raw aluminium: \$114 thousand
- Ingots of stainless steel: \$1.38 thousand
- Bells and other metal decorations: \$5.82 thousand

Other countries buying Cuban scrap metal were:

- In 2013: Italy (\$1.23 million), Holland (\$375 thousand), South Korea (\$35 thousand), Canada (\$3.87 thousand).
- In 2012: Spain (\$2.38 million), Italy (\$1.46 million), Holland (\$395 thousand), Indonesia (\$112 thousand), Thailand (\$30.6 thousand), South Korea (\$6.7 thousand), Panama (\$80.4 thousand), Canada (\$13.6 thousand).
- In 2011: Spain (\$3.14 million), Italy (\$1.97 million), Holland (\$177 thousand), Indonesia (\$155 thousand), Hong Kong (\$39 thousand), Pakistan (\$5.34 thousand), Panama (\$8.91 thousand).

The system has begun renting 25 three-wheeled motor vehicles to self-employed workers in Havana, who work collecting recyclable waste from small and medium-sized state generators of waste and from the population (door-to-door service), using prices based on supply and demand.

Also, 25 premises were rented in different provinces to function as shops for the purchase of raw materials from these workers with the aim of improving the service to the population and increasing recycling.

The difficulties outlined in the previous section have led the State to propose specific “development lines”, in order to encourage the recovery of recyclable materials. One such line is the introduction of technologies that permit the classification of materials at the source, where the waste is generated. Neither ordinary people nor companies currently generating waste in Cuba separate it. There are no separate containers for metals, plastics, paper, glass, organic waste, etc.... Nor would it make sense to create them, if there is no guarantee that these products will then enter into some sort of recycling process.

Another line of development is the modernisation of technologies for products that are already recycled today. In the case of metallic products, this technological modernisation is geared towards:

¹⁵ http://atlas.media.mit.edu/es/visualize/tree_map/hs92/export/cub/show/7602/2011/

1. The scrapping and dismantling of industrial installations and shipping. This investment has already partly been made, as Cuba has a boat scrapping company, located in Bahía Honda, capable of producing large quantities of scrap metal. Its principal problem is the scarcity of ships. Technologies for the dismantling of industrial installations on the island are yet to be developed.

2. The modernisation, relocation and maintenance of specialised transport, and equipment for the lifting and manipulation of waste, which is currently in a critical condition.

3. As a lesser priority for the state, and still in the research phase, the modernisation, relocation and overhaul of compacting equipment, and the introduction of new technologies for cutting, fragmenting and magnetic separation.

For non-metallic products, there are other requirements:

1. Modernising and creating new processing plants for plastics that can handle all types of plastic in circulation, even pellets. In this section some investments have already been made and there are other proposals being studied.

2. Investments have been proposed to increase capacities for the recovery and processing of paper and cardboard.

3. Increasing capacities for the recovery and processing of glass and the reuse and recycling of glass containers is still being studied, along with the modernisation of technologies for cleaning the containers. The Cuban system for the recovery of raw materials only accepts a limited group of glass bottles. None of the beer bottles imported into Cuba are apt for recycling using the technology currently installed. The same is the case for the bottles of Havana Club rum. These create a significant volume of materials that cannot be used. It is therefore necessary to encourage and increase the reuse of bottles and their technological compatibility for recycling.

4. Strengthening and completing the specialised recycling equipment in the country's focal points for tourism and development. Investments have already been made in this area, however it is necessary to carry out new studies following changes and growth in the country's tourist industry.

This is the situation regarding the products that are already being recycled on the island; however, it is also necessary to study the incorporation of new technologies for the products that are not yet recycled, prioritising those that have the highest economic and environmental impact. We are referring, for example, to the recovery and processing of used tyres or electrical goods.

The waste pickers, those people who rummage in the garbage cans, landfill sites and illegal dumps, focus their efforts on a few recyclable products. In order of priority:

1. Metallic cans used for beer, juice and other drinks.
2. Glass bottles (excluding those indicated above)
3. Cardboard
4. Plastic

In reality, this activity remains extremely irregular. The buyers often alter prices when buying from the most vulnerable sector, which is the non-self-employed waste pickers. On occasion, instead of paying in cash, the raw materials are directly exchanged for certain loss-making products that the Company can obtain at low prices.

According to the official discourse, approximately 35% of all potentially reusable waste generated in the country is recycled. However, that calculation is impossible to make without real statistics about the quantity of waste produced; and far less so in conditions where there is a growing commodification and an increasing quantity of consumer goods in the country.

In accordance with current economic designs, the potential production of solid waste on the island is set to increase in the short term. For example, the packaging and containers industry produced 1387 million plastic bags in 2013; and one plant located in Santa Clara produced 219 million PET forms for plastic bottles¹⁶. Although per capita figures for consumption of packaging are unlikely to reach the ostentatious figures of other countries in Europe and North America (between \$300.00 and \$500.00). It currently stands at \$33.00 per capita, and is projected to rise to \$47.00.

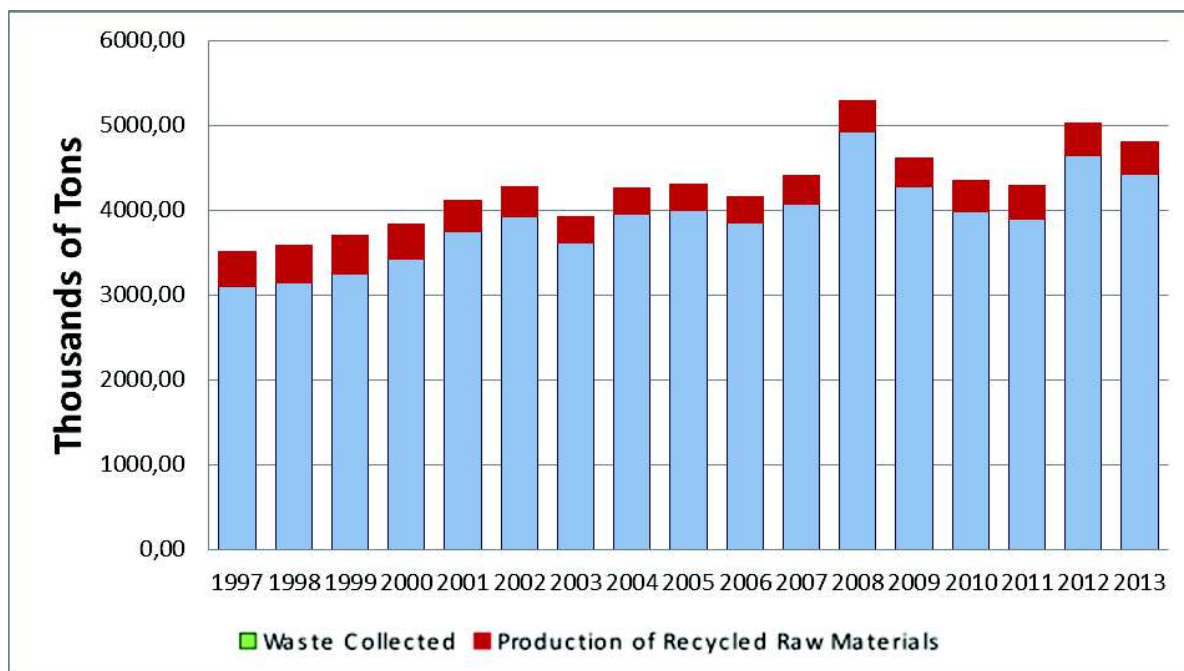
Cuba has invested approximately 500 million dollars to remodel and modernise the container and packaging industry, with between 25 and 30% of this investment going to the plastics industry. In 2013, the country imported 1500 tonnes of polyethylene terephthalate costing 20 000 CUC, and by May of 2014 they had already imported 2 500 tonnes of this product valued at 28 000 CUC¹⁷. According to the Directors of the Union of Companies for the Recovery of Raw Materials speaking on National TV in June of 2013, Cuba currently recycles around 430 thousand tonnes of waste per year.

A review of the statistical annuals of the National Office of Statistics showed an average of around 366 thousand tonnes, if we look at the series from 1997-2013. It is possible that this difference is due to the exclusion of calculations for glass, as this is presented in non-equivalent units.

However, it is clear that the percentage of waste recycled is minimal, compared to how much is collected, and far more so compared to the waste actually produced, much of which never finds its way into the collection systems.

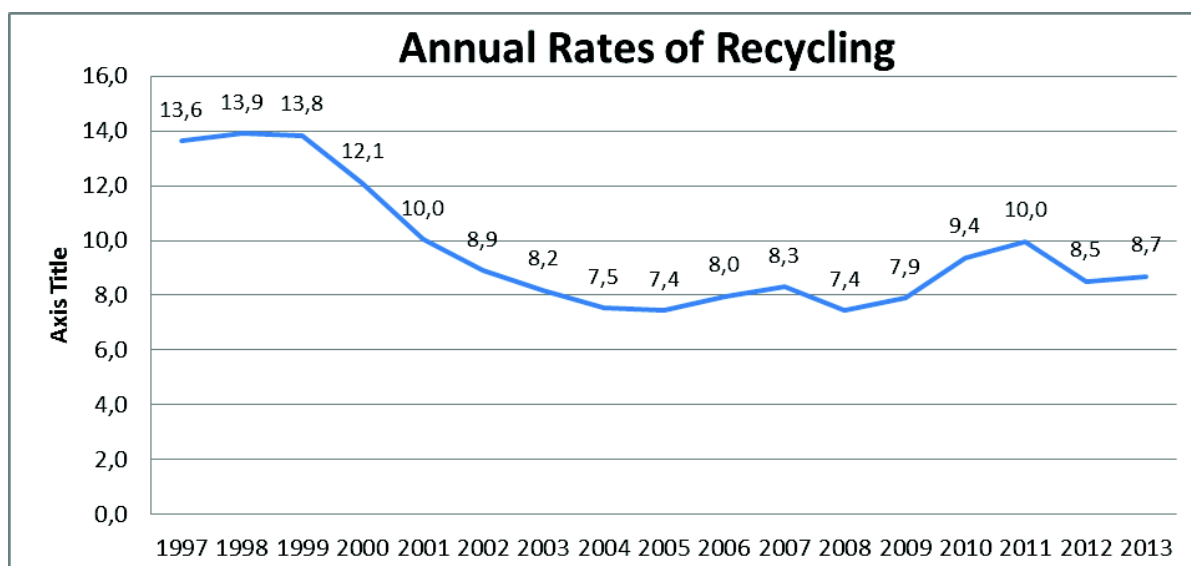
¹⁶ José E Sánchez Abreu (2015): “El reciclaje de los residuos plásticos y sus oportunidades para Cuba”, Revista Caribeña de Ciencias Sociales (April 2015). Online:

¹⁷ Departament for the import of plastic products. MINCEX



In order to understand how recycling activity has really developed over the past 15 years we have produced this graph, based on data from the National Office of Statistics and Information. As you can see the annual rate of recycling has decreased compared to that which took place in the country at the end of the 1990s.

Annual Rates of Recycling



To give an idea of how the management of recyclable waste is going at a local level, we know that in the Municipality of La Lisa, located in the Province of Havana, with around 133 350 inhabitants, around 1.5 tonnes of recyclable plastic waste is produced per month (Municipal Unit for the Recovery of Recyclable Materials). While studies carried out by the State-run Waste Management Company (Comunales), estimate that in the City of Havana, around 2300 tonnes of solid urban waste are collected per day.

On the generation of solid waste per inhabitant, there are no statistics available. Nevertheless, authors such as Juan Joa, consider that the per capita generation of solid waste for developing countries is between 0.4 and 1kg. Using this equivalent, Cuba, with an average population of 11 167 325 inhabitants, could be generating around 7817 tonnes of solid urban waste per day.

In its portfolio of businesses, the Ministry of Industries highlights an interest in creating an integrated waste management system for the country's solid urban waste. This is why, at the XXXII International Fair in Havana (FIHAV 2014) a foreign investment project was presented for the handling of solid waste, obtaining biogas and generating electricity in the province of Camagüey, by Suncurrent S.A., a company, based in Centro Mérida, Yucatán. The project contemplates all the stages of recovering raw materials from waste: correct separation at the point of origin, collection, treatment, recycling and waste-to-energy valuation.

3. OTHER RELEVANT ECOLOGICAL ISSUES

3.1 The Agro-ecological Crisis

The proliferation of agribusiness, and the promotion of intensive agricultural technologies is one of the principal results that the still timid liberalisation of the island's economy is having, with the lifting of obsolete restrictions, but without democratic institutions or citizen's control of any sort. The introduction of genetically modified crops for human consumption should be highlighted here as the most significant and dangerous example of this. The technology for the cultivation of genetically modified organisms (GMOs) is totally incompatible with the Cuban agro-ecological model, that has been theoretically and experimentally developed over the past 20 years, and which is still waiting to be fully tested in practice.

Cuba does not possess any legislation that prohibits or controls the production, use or consumption of genetically modified organisms. Nevertheless, the country signed the Cochabamba Declaration in 2010, which categorically rejects the cultivation of these kinds of crops.

Currently GMO crops, particularly maize and soya, which form part of the basic human diet of the island, are being introduced into Cuban agriculture in an entirely non-transparent fashion, by military enterprises such as CUBASOY. The process is taking place without informing the population of the characteristics and possible health and environmental implications of these crops.

As well as maize and soya, the Centre for Genetic Engineering and Biotechnology is working on the production of other genetically modified organisms, such as: sweet potatoes, tomatoes, potatoes, rice and a variety of transgenic fish like the cat fish.

A report presented in December 2014 to the National Assembly of the People's Power by the Agriculture and Livestock Enterprise Group (Grupo Empresarial Agropecuario) of the Cuban Ministry of the Interior (a military dependency), insists that the aim is to extend “the vital relationship of the Agriculture and Livestock Enterprise Groups with the research centres, in order to apply the newest innovations in agricultural technology”, this is a euphemism behind which the term “genetically modified”, which is rarely used in the national press, are hidden.

The Cuban authorities have not been able to reliably demonstrate that GMOs are harmless to human health or the environment, in the specific conditions of each place. Such tests do not exist in Cuba, which approved the liberation of FR-Bt1 GM Maize into the environment in record time, ignoring the recommendations from experts and calls for a moratorium on the process. Recent exhibitions organized by the Union of Young Communists have been promoting GM maize.

These anti-ecological practices lead to a return to a conventional, resource intensive model of agriculture, extremely dependent on external decisions, that takes autonomy away from the farmers. Agriculture based on GMOs, as well as failing to guarantee genuinely improved yields, leads to the deterioration and loss of agricultural biodiversity, and favours the privatisation and control of seeds, a danger that is more imminent given the expected entry of North American agricultural products into the dynamics of production on the island.

It is known that approximately 70% of processed food in the United States contains GM products, principally maize, soya, cotton, sugar beet, rape seed, and growth hormones for cattle.

Due to the saturation of the market and the strong opposition these products meet in Europe, US seed firms, and agribusiness in general, have set their sights on China and Latin America. The principal players at a global level are Monsanto, Dupont and Dow Chemicals, plus German Bayer and Swiss Syngenta (both already operating in Cuba). Many of these large companies have formed the US Agriculture Coalition for Cuba (USACC) with the supposed aim of lifting the embargo.

3.2 Lack of Environmental Protections and Economic Activity in Protected Areas

The absence on the island of effective legislation for the protection of animals and plants, is a reality that is not the consequence of the latest reforms of Raul Castro, however, it represents a worrying loophole that could aggravate situations such as the trafficking of highly valued specimens and deforestation.

Cuba has a prestigious, internationally recognised National System of Protected Areas, based on the Legal Decree 201 of 1999 which established eight categories for their classification: Nature Reserve, National Park, Ecological Reserve, Distinguished Natural Element, Managed Flora Reserve, Fauna Refuge, Protected Natural Landscape, and Protected Area of Managed Resources.

In total the country has 211 identified protected areas (103 approved and 108 awaiting approval, possibly even in 2015). Of these, 77 are of national significance and 134 are of local significance; 120 are administrated and 91 are not. These areas occupy approximately 20.2 % of the surface of the archipelago, including marine areas of the insular shelf.

Some of the most noteworthy protected areas in Cuba include:

World Heritage Sites: Alexander von Humboldt National Park, Desembarco del Granma National Park.

Biosphere Reserves: the Guanahacabibes Peninsula, Baconao, Buenavista, the Zapata Swamp, Cuchillas del Toa, and Sierra del Rosario.

Ramsar Sites: the Lanier Swamp, the Río Máximo wetlands

Parks: Viñales National Park, the Great Topes de Collantes Natural Park.

This system is an undeniable fortress for the protection and conservation of Cuban wildlife. Nevertheless, not everything functions as it should.

According to the official discourse, these areas are administered by the staff of the Ministry of Science, Technology and the Environment, the National Enterprise for the Protection of Flora and Fauna, and the Integrated Forestry Enterprise. However, it is well known that the Cuban army administers a good part of these spaces, sometimes from the institution itself, as is the case with the Enterprise for the Protection of Flora and Fauna, run by the Commander of the Revolution and Hero of the Republic, Guillermo García Frías. Flora and Fauna even has a Group of Companies with that name, made up of the Flora and Fauna company, and its basic administrative units, the Trading Company ALCONA S.A (which is dedicated to the commercialisation of the “natural excesses” of Conservation, and the export of flamingos and fighting cocks), and the Travel Agents ECOTUR S.A. (specialising in Nature Tourism).

It seems contradictory to protect nature by selling flamingos and fighting cocks, as well as pure bred horses, precious woods (ebony) Cuban crocodiles, snail meat and other species that are freely extracted from the areas they are supposed to be protecting.

The Cuban crocodile (*Crocodylus rhombifer*) is an endemic species, classified since 2008 as in “critical danger” on the International Union for the Conservation of Nature's Red List of Endangered Species. Populations of this reptile have experienced an 80% drop over the past three generations and they are now confined to two areas of the island: the Zapata and Lanier Swamps, both of which are under the jurisdiction of the National System of Protected Areas.

Caribbean flamingos, also on the Red List, are sold for around 1,300 Euros per piece, in this case, with the go ahead of CITES (the Convention on the International Trade in Endangered Species)

The government's decision to further expand first-level tourism, will mean clear, immediate and inevitable difficulties in the management of these Protected Areas with their different levels of ecological significance. The environmental impacts we can expect – and some are already being seen – will also lead to a dramatic reduction of the vegetation cover as a consequence of deforestation. In June of this year they already publicly announced the construction of new golf courses, occupying extensive areas of the Guanahacabibes Peninsula, and area of extremely valuable biodiversity and one of the principal egg-laying sites of Caribbean marine turtles.

3.3 Hydrological Crisis

Owing to the intense drought experienced by a good part of the island (particularly in the East), wide areas of coast and arid lands in the country are undergoing processes that are carrying them towards desertification. To this we must add the impoverished and over exploited system of reservoirs and water distribution – the design of which have already impacted radically on Cuban ecosystems, which are in the midst of an acute crisis, preventing them from satisfying the national demands for water from agriculture, industry and human consumption. More than 50% of the water in this system is lost to leaks.

Under these circumstances, the new policies for the commercialisation of fresh water destined for tourism and export will only worsen the situation. Another example of the disastrous strategies of the Cuban authorities is related to projects – already under way – for the development of a significant number of golf courses and construction projects, that will bring with them an exorbitant increase in water consumption. Furthermore, the island does not have an adequate system for monitoring the quality of ground and coastal waters.

The intense and prolonged drought is above all affecting the Eastern side of the island, where, since 2012 increasingly scarce rainfall has led to the total or partial depletion of more than 350 water sources. The rains will keep decreasing on the Eastern side of the country and drought events are going to become more frequent and be longer and more intense. Together with increased rates of evaporation, this will contribute to the deterioration of soil and water reserves.¹⁸

In the centre of the country, 90% of the territories of the Province of Cienfuegos experienced a lack of rainfall between November of 2014 and April of this year, yet the Ministry of Tourism has continued to promote the nine golf courses there, with more than 22 400 hotel rooms in the surrounding area. The West of the island is not faring much better, showing record high temperatures which are affecting water management.

3.4 A Contaminating Energy Matrix

The island continues to opt for the use of polluting energy sources, particularly fossil fuels via the exploration in the Exclusive Economic Zone in the Gulf of Mexico, where it is estimated that there are around 20 billion barrels of oil.

To date the results of the explorations have been negative, but Cuban elites have continued to invest millions in infrastructure. Following and intensive modernisation of the thermoelectric plants which took place ten years ago, there is now work taking place at the Cienfuegos refinery, the Cienfuegos-Matanzas pipeline, the storage space for 600 thousand barrels in Matanzas, and on the mega-port at El Mariel.

The extractivist matrix more recently incorporated a new process to be applied to the country's most overexploited mineral deposits, with the injection of vapour and water to stimulate the subsoil, in a process very similar to that known as fracking. International prices for crude oil have fallen by half in just over a year and recent projections indicate that they will continue to fall in 2016.

Nevertheless, by late 2016 or early 2017, Cuba will again carry out sea-bed explorations in the Gulf of Mexico, as part of shared production contracts together with the Venezuelan State Oil Company PDVSA and the Angolan company, Sonangol. Renewable energy sources are hesitantly beginning to appear in the national plans and in the official discourse, but there is little to show for it to date.

3.5 The impact of opencast mining

Opencast mining in Cuba takes place due to the participation of corporations in joint ventures. The Canadian company, Sherritt International, which has been operating for more than 20 years is worth highlighting. Sherritt produces around two thirds of the oil extracted in Cuba and has a 49% stake in the joint venture that

¹⁸ “Impacto del Cambio Climático y Medidas de Adaptación en Cuba”. Group of Authors. Havana, 2014.

manages the mining areas of Moa, in the Province of Holguín, in the East of Cuba, for the extraction, processing and refining of nickel and cobalt. Sherritt also indirectly controls one third of the stake in Energas, a joint venture for the generation of electricity in Cuba. The other two thirds are held by the nationalised companies Unión Eléctrica and CubaPetróleo.

According to data from 2012¹⁹, 30 Cuban Construction Ministry organisations obtained a total of 190 mining rights, of which more than 150 are for the strip-mining of quarries, an activity that has a profound environmental impact that often continues even after the mining operations have ended.

The operational lifespan of a mine is between 10 and 100 years, however, the related environmental and social impacts persist for far longer. The negative impact on the environment comes, generally speaking from the total destruction of the vegetation, fauna, topography and landscape, as well as secondary effects related principally with the pollution of the soil, air and rivers.

The following table summarises the expected environmental impacts of the opencast mining operations on the island, as recognised by Cuban technicians²⁰

MEDIUM	ENVIRONMENTAL FACTOR	ACTION/ACTIVITY	IMPACT
PHYSICAL	Climatology	Perforation, loading and blasting Transport of machinery Earth moving The formation of slag heaps Dry Mechanical Preparation	Emission of gases and dust to the atmosphere Noise emissions and vibrations
	Hydrography	Excavations, perforations, Wet Mechanical Preparation Spills of fuel and lubricants Transport routes Infrastructure	Changes to water quality due to the deposition of solids, obstruction and silting of rivers, changes to the water table, increased sedimentation. Contamination of local aquifers and blackwater waste
	Geology and Geomorphology	Tailings Perforations and Fragmentation Building slopes Road construction	Increased erosion Topographical changes
	Landscape	Clearing vegetation Tailings Perforation, loading and blasting Abandoning of the mine	Changes to the visual quality of the landscape

¹⁹ Montero Matos, Julio and Otaño Noguel, José: "Impacto socioeconómico y ambiental de la creación de un procedimiento para efectuar el cierre de canteras de materiales de construcción en Cuba" in **Revista Caribeña de Ciencias Sociales**, November 2012, <http://caribeña.eumed.net/impacto-socioeconomico-y-ambiental-de-la-creacion-de-un-procedimiento-para-efectuar-el->

²⁰ Montes de Oca Risco, Alexis: "Estudio del impacto ambiental y medidas de rehabilitación en la cantera Los Guaos" in <http://www.eumed.net/rev/delos/13/amor.html>

MEDIUM	ENVIRONMENTAL FACTOR	ACTION/ACTIVITY	IMPACT
		Road construction Infrastructure	
BIOTIC	Flora	Clearing vegetation Perforation, loading and blasting. Road construction Tailings Abandoning the mine Infrastructure Sediment dumps	Removal of vegetation and deforestation
	Fauna	Road construction Perforation, loading and blasting Excavations Transport of material Clearing of vegetation Infrastructure Tailings	Changes to natural habitat and displacement of fauna.
	Ecological Balance	Clearing vegetation Perforation, loading and blasting Road construction Transport of material Abandoning the mine Dumps Earth moving	Changes to material and energy flows Loss of biodiversity
ANTHROPIC	Economic	Commercialisation Road construction Infrastructure Transport	Increased employment Increased demand for social services
	Social	Road construction Abandoning the mine Clearing vegetation Infrastructure Transport Polluting gas emissions	Increase in the number of accidents Increase in the number of illnesses
	Cultural	Commercialisation	Enriching cultural diversity

See the classification of environmental impacts in Annex 6.7

Most of these impacts are impossible to avoid, particularly in the Cuban context, where the environmental dimension is often not included in the proposed mining projects, environmental restoration is not implicit in the system of exploitation, and there is insufficient environmental training among workers, technicians and managers²¹.

²¹ Montes de Oca Risco, Alexis: *“Impactos en el medio ambiente producido por la explotación de las canteras en Cuba”*, in <http://www.monografias.com/trabajos82/medio-ambiente-explotacion-canteras/medio-ambiente-explotacion-canteras2.shtml#ixzz3t9sLyuzu>

Failure to comply with environmental legislation relating to mining projects has led, on occasion, to the exploited land not being adequately rehabilitated when the mining operations cease, as was the case in the El Cacao quarry, located in the South of Jiguaní, in the province of Granma, following more than 40 years of mining there²².

At a national level there are some mining companies that carry out simultaneous or after the fact rehabilitation of their exploitations, and which have taken on the environmental costs of their productive activities, however, this is not the norm, and it is not possible for activists to know which companies are not applying the correct measures as proposed by specialists (See Annex 6.8)

In January of 2007 the Mining Rehabilitation Enterprise was created, in an attempt to minimise the impact of mining on the environment and re-establish the ecological balance. This company basically works on reforestation, and, above all on tree felling in the areas where mines will be set up. They do this work with three brigades of lumberjacks and one of colliers, who work in the mountains, and a saw mill that they built using old, recovered machinery, some of it more than a century old. This means that with the advance of the mining industry, more than 50% of the wood is lost, much of it hard- or semi-hardwood.²³

Mining activities in the East of Cuba have led to the creation of what are called “lunar landscapes”, which is to say, the almost total annihilation of life in the places where the mines are set up; also affecting the human communities nearby, the inhabitants of which suffer acute respiratory illnesses due to the persistent red dust that covers their villages. This information comes from the observations of people who have visited the areas. I have not seen any official reports on this issue. Nor is it easy to access these areas, as they are geographically distant and subject to a certain level of military surveillance, because they are considered strategically important for the national economy.

Nevertheless, a review of mining exploitation over the past five years²⁴ shows a slight fall in production, as can be seen in the following graph²⁵.

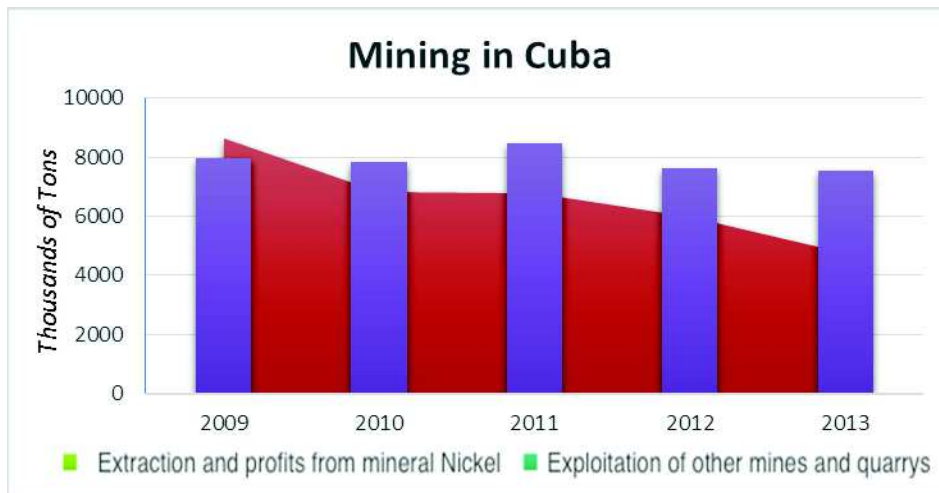
Mining in Cuba

²² Minería y Geología / v.27 n.1 / January-March/ 2011 in <http://www.redalyc.org/pdf/2235/223522419003.pdf>

²³ Valdés Paz, Manuel: “Minería a cielo abierto. De la luna a la tierra”
in:<http://www.ahora.cu/suplementos/serrania/12546-de-la-luna-a-la-tierra>

²⁴ Oficina Nacional de Estadística e Información, 2015: “Anuario Estadístico de Cuba 2014”
in:<http://www.onei.cu/aec2014/00%20Anuario%20Estadistico%202014.pdf>

²⁵ Other mines and quarries include: clay for cement, red clay for ceramics, refractory clay, bentonite, limestone for the cement industry, limestone for the chemicals industry, kaolin, carbonated silt, feldspar, phosphorite, marl for the cement industry, stone for masonry, aggregate, gravel, rock salt, tuff for cement, plaster, zeolite. The production of marble, alluvial sand and silica sand, are excluded from this graphic as they appear using non-equivalent units.



This drop could mean new negative impacts for the mountainous ecosystems in the East, as it may indicate a need to open new mines or expand existing ones in order to maintain productivity. Cuba produces approximately 28 thousand tonnes of nickel and cobalt per year, which is very highly valued on the international markets. In recent declarations, the directors of Sherritt have expressed the possible positive impact of their economic activity for the re-establishing of relations between Cuba and the US.

In fact, the company's shares shot up by more than 26% following the announcement that conversations were taking place between the countries. The Canadian company plans to expand its business in Cuba with the construction of a sulphuric acid plant that will reduce its operating costs.

4. THE PRESENT AND FUTURE OF ENVIRONMENTAL WORK IN CUBA

4.1 Cuban ecological organisations

In recent decades a series of community projects, institutions, associations, and scientific societies have emerged, some of which are closely linked to the state and its institutional framework, but which have some interesting autonomous spaces, and have produced some very valuable research.

The consolidation of a strong, independent, informed ecologist movement that is connected with its global peers, is an urgent necessity for Cuba. In fact, it could be understood as the most important environmental challenge for the nation, as from that solutions and responses to the current pillaging of the environmental may emerge.

Of course, this movement must be formed with an awareness of the particularities of the nation, its limitations and its regulations.

5 CONCLUSIONS

- Cuba has an institutional framework that has produced a real base of knowledge and structures to favour the environment on the island.
- The Cuban ecological footprint is 1.9, placing it in 68th place among the 151 countries assessed by the Global Footprint Network in 2007²⁶, and seventh among the nations of the Latin America and the Caribbean region. (The Czech Republic is in 138th place with 5.4).
- The system is suffering significant stagnation of these structures, as most of them do not work or even serve to maintain certain environmental pillaging.
- The lack of transparency in Cuban institutional processes does not allow access to much information, and what information is available is not reliable, due to the mechanisms of corruption functioning on the island.
- Empirical evidence suggests a deplorable state of the environment of the island, above all since the opening up of the economy in recent decades, the promotion of tourism, and now the entry of US businesses.
- The most pressing environmental problems are: a) The agro-ecological crisis, with the development of non-sustainable agriculture and the introduction of GMOs, b) The lack of environmental protection and economic activity in protected Areas, which has led to a significant increase in deforestation and the increasing vulnerability of species, c) the treatment of solid waste, d) the hydrological crisis, e) the continued application of a contaminating energy matrix, and f) the impact of opencast mining.
- Cuba does not have an autonomous ecologist movement that is well-informed about the nation's environmental situation, but it does have an aware public, and diverse agents for change.
- The Treatment of Solid Waste is not the most serious problem facing the island, however it is the one that offers most possibilities for articulating a real, grassroots environmentalist movement, with autonomy and the capacity to resist the democratic limitations peculiar to the island.
- International support is vital for capacity building among both specialists and more grassroots activists.

Prague, 10th December 2015

²⁶ <http://www.footprintnetwork.org/http://www.footprintnetwork.org/>

6. ANNEXES

6.1. List of examples of multimedia created by the science and education system in Cuba^{27,28}:

- Cuban Environmental Law
- The Environmental Mission
- Medicinal Plants
- My little farm
- The Cuban Environment
- The Cuban Archipelago
- Nature
- Environmental Training for Business
- My friend the Earth
- The world of coral
- Cuba: protected nature
- Climate Change. The ongoing challenge
- Birds exclusive to Cuba
- On the Waterways
- Environmental Education for Teachers
- Little Encyclopaedia of Domestic Animals
- From the Amazon to the Caribbean in a Canoe
- Natural and Traditional Medicine
- Environmental Education and Management in Cuba
- Understand and Protect Cuban Nature
- Environmental Education and Management in Cuba
- Meteorology for Journalism
- Module for Educators and Communicators
- Science and Community in the management of Natural Resources, a shared responsibility
- Environmental Economy. Concepts and practical applications
- The Ramal Programme. Analysis and prognosis for the weather and the climate
- The Ramal Science and Technology Programme

²⁷ <http://www.educambiente.co.cu/>

²⁸ <http://www.redciencia.cu/>

6.2 Pamphlets from the educational series "Protect your family from ..."²⁹, on issues such as:

- Protect your family from Hurricanes, tornadoes and electrical storms.
- Protect your family from the consequences of climate change.
- Protect your family from rising sea levels and extreme wave events.
- Protect your family from mountain torrents, swollen rivers and floods.
- Protect your family from erosion and the loss of soil and woodland.
- Protect your family from landslides.
- Protect your family from earthquakes and tsunamis.
- Protect your family from contaminated water.

6.3 Some scientific journals³⁰ of an environmental nature, edited by State Institutions:

- The Cuban Acta Botánica (The Institute for Ecology and Systems)
- Phytohealth (Fitosanidad) (The Cuban Institute for Plant Health)
- Flora and Fauna (The National Enterprise for the Protection of Flora and Fauna)
- Poeyana (The Institute of Ecology and Systems)
- The Cuban Geographic Journal (Revista Cubana de Geografía) (The Institute of Tropical Geography)
- The Cuban Journal of Environmental Law (Revista Cubana de Derecho Ambiental) (still being set up)

6.4 Law 33 of 10th January 1981 "On the Protection of the Environment and the Rational Use of Natural Resources"

ARTICLE 13.- The Organs of the State's Central Administration, particularly those responsible for governing and state control over the use and administration of natural resources, in compliance with their specific duties, attributes and functions relating to the protection of the environment should:

m) Safeguard, within the sphere of their competence, the use, movement, treatment and final depositing of the waste generated in their productive processes.

ARTICLE 15.- It falls to the Local Organs of the People's Power, and their respective bodies, to direct, coordinate and control as far as their competence allows and in compliance with the applicable legislation, actions relating to:

c) Land use, forestation, reforestation, transport routes, construction, public services and sanitation.

²⁹ <http://www.redciencia.cu/cdorigen/arca/protegefam.html>

³⁰ <http://revistas.geotech.cu/>

d) Protection of the environment in human settlements, relating to the effects of community services, vehicles in transit and local transport.

ARTICLE 108.- With a view to the prevention and control of soil contamination, the competent bodies will act according to the following regulations:

a) All natural persons and legal entities have a duty to use correct practices in the generation, handling and treatment of domestic, industrial and agricultural waste and in the use of any chemical or hormonal substances that could contaminate soil or crops.

b) Special care should be taken to avoid and control soil contamination and guarantee an adequate final disposal of domestic, industrial and hospital waste.

c) The dumping of waste on urban and rural wastelands and the areas around land transport routes without prior authorisation from the competent authorities is prohibited.

ARTICLE 136. - Preventative measures for the protection of the landscape aim to guarantee that actions affecting them are developed in harmony with the area to be protected. To this end, the following activities are to be particularly controlled and regulated:

g) The dumping and transport of materials, raw materials, detritus and all types of waste.

ARTICLE 147.- Dumping, emissions, out flow, waste, the production of sound, noise, smells, vibrations and other physical factors that affect or could affect human health or damage the quality of life of the population is prohibited.

Natural persons or legal entities who contravene the prohibitions established in the above paragraph will be held responsible in accordance with the applicable laws.

ARTICLE 149.- The Ministry of Public Health will carry out actions to verify that the service provision of services referred to in the previous article, as well as those relating to the collection of solid waste and their final dumping in landfill sites, among other public services essential to the community, comply with the regulations that guarantee the protection of the environment, and in particular the health and quality of life of the population.

ARTICLE 150.- The initiation of the construction, extension or modification of human settlements requires the approval, in the land demarcation plans, of a plan for water supply, sewage and solid waste, specifying sewage networks, necessary infrastructure and other waste disposal systems as required.

ARTICLE 153.- The import of dangerous and radioactive waste requires the prior and express authorisation of the Ministry of Science, Technology and the Environment, and for that to be granted the import must take place according to the applicable international recommendations and national regulations and socially justified applications must be foreseen.

ARTICLE 154.- The illicit trafficking of dangerous waste will be punished in accordance with existing legislation.

ARTICLE 155.- The Ministry of Science, Technology and the Environment, in coordination with the relevant competent bodies, is responsible for establishing regulations for the classification, handling and export of dangerous waste.

ARTICLE 161.- Employers should adopt and put into practice measures for the protection of the environment and to safeguard the health and lives of their workers and the surrounding population, particularly in relation to:

c) Avoiding the accumulation of waste that constitutes a health risk, periodically carrying out the pertinent cleaning and disinfecting activities.

6.5 Summary of the Articles of the Law 1288/75

ARTICLE 1. State bodies and other dependencies are obliged to collect the waste raw materials, and reusable products and materials that will not be used by those organisations in their productive processes and services, with the aim of these being collected and recovered in accordance with this Law.

In cases where the reusable waste products and materials could be used by the bodies themselves or their dependencies, they will be obliged to use them, and only the excesses that cannot be used by these bodies will be subject to the terms of this Law.

ARTICLE 2. In addition to the waste, products and materials that have historically been reused by industry, any other reusable product or waste should be collected, and its usefulness determined later, with a view to its use in some sector of the national economy.

ARTICLE 3. The organisations and other dependencies to which this Law refers should foresee, in their current investments and facilities and those they plan for the future, the conditions or means necessary for the conservation, preparation, guarantee of quality and delivery of recyclable waste and reusable products and materials.

ARTICLE 4. The Central Planning Council, through specific regulations will determine the inclusion of the delivery of recyclable waste and reusable products and materials in the technical economic plans of those bodies and dependencies that generate them.

ARTICLE 5. The above mentioned bodies and dependencies will be responsible for the preservation, collection, selection, conditioning, packaging of recyclable waste and reusable products and materials, to conform with the dictates of the regulations implemented to that effect.

ARTICLE 6. The relationship between producers and receivers of recyclable waste and reusable products and materials, in accordance with this Law, will be established through agreements signed between the parties, that will specify the conditions of delivery, and norms for collection, preservation and packaging.

ARTICLE 7. Failure to comply with the obligations established in Articles 1, 2, 3 and 5 will be subject to the regulations in ARTICLE 556 of the Civil Defence Code, and the Basic Industries Sector is responsible for producing draft Regulations that will go before the President of the Republic for his consideration, and until

this is enacted, he is authorised to dictate the regulations necessary for the better application of the existing Laws.

ARTICLE 8. The Vice Prime Minister of the Basic Industries Sector is responsible for producing draft Regulations that will go before the President of the Republic for his consideration, and until this is enacted, he is authorised to dictate the regulations necessary for the better application of the existing Laws.

6.6 List of prohibited products that the state system for the collection of raw materials will not accept:

- spare parts
- park benches
- storm drains
- retorts and dross
- swarfs and filings
- zinc dross
- standard weights
- counter weights from service lifts
- ball bearings and pedestals
- street signs
- man-hole covers
- hydrant covers
- church bells
- parts of monuments
- magnesium steel mats
- angles and crossarms from electric pylons
- pieces from the sugar plants
- motors and gearboxes from automobiles
- brake pads from locomotive and train carriages
- scrap metal from the dismantling of aircraft, ships and railway equipment
- copper telephone cables, with or without insulation
- articles from cemeteries (crosses, gravestones, tombs, statues)
- utensils, and parts from armaments and disused military equipment
- new blocks and sheets of in bronze, copper or aluminium
- pressurised irrigation tubes and other components
- aluminium industrial radiators and condensers
- the elements, parts and pieces that make up the rail network

6.7 Classification of environmental impacts

CLASSIFICATION OF ENVIRONMENTAL IMPACTS ON THE PHYSICAL MEDIUM

Emission of dust into the atmosphere: in the area studied, one of the principal air contaminants were the dust clouds, particularly caused by the traffic of trucks along unpaved roads, blasting activities, open air slag heaps, the production of mechanical preparation through dry methods, and the perforations made for the blasting, leading to suspended particles, which depending on their particle size, humidity levels, and prevailing wind, can be transported variable distances. To clarify, in times of water shortage or drought, dust emissions are massively increased and they reduce air quality, damaging that natural resource.

Emission of gas into the atmosphere: Another factor affecting air pollution are the nitrates emitted during the blasting, and the gases produced by combustion in the diesel equipment, such as carbon monoxide, which is absorbed by the lungs and reacts with haemoglobin to form carboxyhaemoglobin, which reduces the body's capacity to transport oxygen in the blood.

Noise emissions: Human beings are subjected during a large part of the day to the more or less direct influence of noise, causing distress that, in the long, term, can become serious injuries to the auditory and nervous systems, with concomitant psychological effects. The most serious consequences of this noise are:

- Temporary auditory effects
- Auditory illness or permanent damage
- Interference in communication
- Effects on the cardiovascular, respiratory, digestive and central nervous systems

Types of noise emission include continuous and variable, and high intensity

Continuous and variable noise emissions: continuous noise emissions are produced by the movement of machinery on the work site, and variable emissions are generated by the passing of tipper trucks, loading equipment and smaller vehicles transporting fuel, raw materials, personnel and essential goods, and by the technological processes of the mechanical preparation.

High intensity noise emissions: the explosions and detonations that take place during the daily operation of a mine are considered high intensity emissions, and they significantly affect the residents' quality of life.

Changes to water quality due to solid deposits:

The area studied includes the Los Guaos river. It is not only the German and Spanish plants that affect the quality of the water in this river, as there are other economic endeavours such as pig farming. The fundamental source of water contamination from the mine comes from the washing of slurry dumped directly onto the ground behind the mechanical workshop at the Spanish plant, very close to the pool for water recirculation which, due to its poor state, often overflows, adding to the rainfall

that carries these slurries into the river. The marks of this process can be seen on the land. Another source of contamination are the deposits of dust particles carried in the air from the German plant.

Contamination of aquifers with liquid waste:

The presence of liquid waste in the aquifers affects water quality. This waste generally comes from sanitation facilities, diners, waste oil and lubricants. In the case of the area studied there are not high levels of this kind of contamination as there is a pre-treatment system consisting of filters and septic tanks for the sanitary installations, preventing contact between the sewage and the river or ground water. The biggest harm is caused by kitchen waste that is thrown directly into the water.

Topographic changes and effects on soil composition:

There are changes to the slope of the land caused by the construction of access roads to the mine, changing the geomorphology of the site studied. The removal of overburden, and other the mining activities lead to significant geomorphological changes. A negative geomorphological impact is observed in the form of altered geoforms. This impact is considered important as it happens in the short term and is irreversible.

Increased erosion:

The construction of the access roads to the mines, and work at the mine face, with the operation of machinery such as bulldozers, earth movers, trucks and diggers, moves a lot of the soil, producing increased erosion in the area of the quarry.

CLASSIFICATION OF ENVIRONMENTAL IMPACTS ON THE BIOTICO MEDIUM

Loss of vegetation and deforestation:

The removal of the vegetation and flora takes place on the surface of the quarry and its access roads. In the area studied it was observed that some plant species remained, reducing the loss of plant cover. Trees such as Tonka, Palo Bobo, Almond and Mango, were to be found there, species which in these areas are found in moderate numbers. Nevertheless, within the mine works the destruction of plant cover was evident, due to the felling of trees to open up roads and access routes to the area of exploitation.

Loss of biodiversity:

Some recent discussions on conservation of biodiversity have recognised the close links between biodiversity and cultural diversity, proposing that both should be conserved in a local environment. The operations at the mine lead to the loss of some species, principally those of more sedentary habits, such as reptiles and small mammals, also birds, but to a lesser extent: their loss is considered small and of little magnitude, as it only affects a small number of specimens.

CLASSIFICATION OF ENVIRONMENTAL IMPACTS ON THE ANTHROPIC MEDIUM

Increase in accidents:

In relation to accidents, it is difficult to determine their possible increase due to the operation of the plant, as it is probable that while this is ongoing, there will be an increase in the number of accidents on the personnel transport routes, however it is not foreseeable through association with the traffic generated by the project.

Increase in illness:

The emission of pollutants is damaging to human health. That is why the regulations establish environmental patterns and tolerable limits for chemical and physical agents that could affect the health of workers. Failure to observe these regulations in the quarry causes chronic and acute illnesses, for example, stress, which has considerable impact on the workers and machine operators, making their work more difficult, aggravated by bad living conditions and lack of hygiene. Mine work is very demanding, particularly in this mine which does not have the necessary technological machinery or safety implementations, meaning that the mine worker works in unfavourable conditions, in terms of noise, dust and the gases emitted by the machines. These cause serious hearing and breathing problems, the food is usually not good and does not compensate the energy used by the body, leading to accelerated weight loss and reduced quality of life.

6.8 Corrective measures to reduce the impact of mining activities

Impact	Corrective Measures
Soil	<ul style="list-style-type: none"> · Conservation and reuse of the layers of soil in the rehabilitation process. · Encouraging the growth of grass on the slag heaps. · Filling in the holes with waste material
Air	<ul style="list-style-type: none"> · Periodic watering of the roads, dumps and slag heaps. · Compacting and asphaltting the access routes. · The use of dust catchers for the perforations. · Reducing the time between exploitation and rehabilitation. · Limiting traffic speeds. · Installing wind breaks. · The use of protected conveyor belts. · Using moisturizing agents in the treatment of the materials. · Reducing the height of the waste pile. · Installation of silencers and correct maintenance of the machinery. · Covering material to be transported with tarpaulin. · Encouraging the spontaneous growth of vegetation on the dumps and slag heaps. · Reducing the operating load of the explosives and the use of short delay detonators. · Covering the fuse. · Sequenced and progressive clearing of the vegetation in the extraction zone.
Water	<ul style="list-style-type: none"> · Locating slag heaps and installations away from intermittent natural water courses. · Creating a drainage network with perimeter canals. · Reuse of treatment waters. · Collection and treatment of liquid waste from the maintenance of the machinery.