

SUMMARY OF THE NATIONAL ACTION PLAN FOR ARTISANAL AND SMALL SCALE GOLD MINING IN COSTA RICA, IN ACCORDANCE WITH THE MINAMATA CONVENTION ON MERCURY



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INDEX

CRE	DIT	S	7				
ACK	(NC	WLEDGMENTS	9				
Def	init	ions	12				
I.	Int	roduction	13				
П.	National Overview						
	1.	Geographical distribution of ASGM	13				
	2.	Legal and regulatory status	14				
	3.	Mining and processing information	16				
	4.	Gold commercialization	18				
	5.	Baseline estimates of the amount of mercury used in ASGM	19				
	6.	Socioeconomic characterization of the activity					
	7.	Environmental information	22				
	8.	Health information					
III.	National Objective and Reduction Targets.						
	1.	National Objective					
	2.	Strategies and goals of the National Action Plan					
IV.	Implementation strategies						
	Ι.	Steps to facilitate the formalization of ASGM					
	2.	Strategies to eliminate worst practices and reduce emissions, releases and exposure risks	27				
	3.	Strategies for managing trade and preventing diversion of mercury and mercury compounds					
	4.	Strategies for involving stakeholders in the implementation and continuing development of the plan					
	5.	Public health regulation to minimize exposure to mercury					
	6.	Strategies to prevent exposure of vulnerable populations to mercury through epidemiological analysis (exposure to mercury and other health risk factors (RF) in ASGM).	31				
	7.	Strategies for providing information to miners	32				
	8.	Additional strategies: encourage market mechanisms that favor sustainably mined gold.					

DEFINITIONS

Coligallero	According to DE-37225-MINAE: "A person who extracts ore in an artisanal way." (Ministerio de Ambiente y Energía, 2016)			
Dore	Blend of gold, silver and other impurities obtained through smelting sponge gold. (Artisanal Gold Council; United Nations Environment Programme, 2012)			
Sponge gold	It is the name given to gold extracted by amalgamation with mercury. When the mercury is distilled, it leaves numerous holes in the mineral, like a sponge. In addition to gold, it contains mercury, silver, and other impurities. (Artisanal Gold Council; United Nations Environment Programme, 2012)			
Tailings / Lamas	Finely ground solids discarded in mining operations.			
Artisanal and small scale gold mining	means gold mining conducted by individual miners or small enterprises with limited capital investment and production (Minamata Convention).			
Paragenesis	Equilibrium sequence of mineral phases with sulfides (Huapaya, 2013).			
Gender perspective	The NAP's gender perspective is founded on the following basic criteria: identifying gender disparities, acknowledging the impacts of mining activities that vary according to gender, and identifying how women and men access, use, and control the resources and benefits of the activity.			
Rastras	Rudimentary machinery for gold amalgamation and fine material grinding, consisting of rotating metal plates with flat rocks attached to one side. (DIGECA, 2017)			

I. INTRODUCTION

The Initial Assessment of the Minamata Convention, completed in 2015, identified artisanal and small scale gold mining (ASGM) as a critical activity for the country. Not only because of the use of mercury in the extraction techniques, but also because of the social, economic, environmental, and health consequences in Guanacaste's Abangares canton, where these communities are concentrated.

Mining has a long history in the canton of Abangares, both on an industrial scale and at the ASGM level. However, the latter has been poorly regulated because of legislative flaws that promote informality. This National Action Plan for ASGM seeks to develop a plan of action to reduce the use of mercury in this activity while also assisting in its formalization and the use of new technologies that lessen its detrimental effects on human health and the environment.

This document presents a summary of the diagnostic studies carried out as part of the project "Development of the Minamata National Action Plan to reduce and as far as practicable eliminate the use of mercury in artisanal gold mining in Costa Rica to protect health and the environment and in accordance with Law 8904," as well as the recommendations based on these studies. The corresponding document can be found at the Environmental Quality Management Directorate's (DIGECA) website, <u>www.digeca.go.cr</u>.

II. NATIONAL OVERVIEW

According to the national baseline studies conducted for this National Action Plan, material processing is carried out through manual extraction of material from tunnels using explosives and basic machinery. Each person involved in this activity extracts one to ten metric tons of material per day from areas without a concession authorized by the Directorate of Geology and Mines (DGM); if they do not own the land, they pay for or lease the use of the area where the mine is located.

1. Geographical distribution of ASGM

Due to the history of mining development and the way it influenced the territorial division, the area between the cantons of Abangares and Tilarán, where the first mining companies settled, is traditionally called the Tilarán-Abangares mining district; that is, this mining district does not correspond to the political-administrative units called districts in Costa Rica. The main area where ASGM is currently being developed is in the canton of Abangares, in the province of Guanacaste. According to the political-administrative division, this canton is divided into four districts: Colorado, Las Juntas, San Juan, and Sierra. Extraction activities are concentrated in the latter two.

Miners who use the mercury amalgamation process can be found in the districts of San Juan, Las Juntas, and Sierra. Given the location of the processing sites, as well as the lack of knowledge and enforcement of the management plan for the protected area, many of these processing sites are located in the Abangares Protected Area, where the human impact should be minimal or moderate.

2. Legal and regulatory status

A major omission in the legislation is the lack of provisions tending to regularize artisanal and small scale mining previously in operation by establishing or reforming the legal requirements necessary to obtain the respective concession.

Law 8904 Mining Code Reform and its amendments law to declare Costa Rica a country free of open-pit metal mining, declared Costa Rica a country free of open-pit metal mining, stating that no permits or concessions will be granted for open-pit metal mining exploration and exploitation activities in national territory, with the exception of mining reserve zones (blocked in favor of the State) in the cantons of Abangares, Osa, and Golfito.

Exploration permits, mining exploitation concessions, and benefits of material may only be granted in said mining reserve zones to workers duly organized in cooperatives dedicated to small scale mining for family subsistence, artisanal and coligallero, in accordance with the conditions established in this Law and its Regulations. Based on the number of members of such cooperatives, these permits and concessions will be granted exclusively to workers' cooperatives for the development of small scale mining for family subsistence, artisanal and coligalleros of the communities neighboring the mining exploitation.

To date, this legal form seems to have been accepted by the villagers, at least in the Abangares area, and has been declared constitutional. However, the requirements for the aforementioned sites would exempt anyone who participates in ASGM on their own from the law.

From a regulatory standpoint, a distinction must be made between a) ongoing activities (especially in the Abangares area) and b) activities to be carried out in new areas where there are no previous mining operations. There will be no legal obstacles for the latter; they must simply follow the corresponding procedure before the Directorate of Geology and Mines (DGM) and the National Environmental Technical Secretariat (SETENA for its Spanish acronym), primarily through the presentation and review of an environmental impact study and the granting of the environmental license; after the other requirements to obtain the respective mining concession have been met. In conclusion, regarding new ASGM activities, the environmental impact study should be applied eventually using a mechanism tailored to the specifics of the industry, as would be the proposal of a mining environmental impact sould be made without compromising the constitutional right and guarantee to a healthy environment provided by Article 50 of the Political Constitution of Costa Rica.

However, there are barriers to regularization in the case of mining that is currently done without a concession and other requirements because of the provisions of Article 3 of the Mining Code (which forbids for 10 years those who exploit the resource without the appropriate concession) and the need for an environmental impact study. On the other hand, the Organic Environmental Law and related regulations do not allow the use of this instrument in the case of ongoing activities.

The Costa Rican mining legal framework, specifically designed for the sector and fundamentally contemplated in Law 8904, has not been able to deploy its effectiveness in the face of legal barriers imposed by other laws, the impact and ramifications of which were not adequately considered when this body of law was approved. This conclusion necessitates the adoption of legislation that regulates ASGM in a comprehensive and consistent manner, avoiding the identified discrepancies, gaps, barriers, and contradictions. As a result, other applicable legal provisions, such as mercury and cyanide registration, commercialization, and use, sanitary operating permits and municipal licenses, and authorizations for the export of materials (gold), among others, cannot be implemented in the absence of legality in the operation.

The following table summarizes the legal framework analyzed for ASGM in Costa Rica.

Regulations	Article	Importance/ Relevance
	Art. 9	It establishes the State's dominion over the resources and wealth of the subsoil.
Political Constitution of	Art. 50	The right toa healthy and ecologically balanced environment.
Costa Rica	Art. 121	The resources may be exploited by the public administration or by private parties, in accordance with the law or by means of a special concession granted for a limited period by the Legislative Assembly.
Law 9391, Minamata Mercury Convention	Art 7.	Actions for parties with a significant ASGM to reduce and, where possible, eliminate the use of mercury and mercury compounds in these activities, as well as mercury emissions and releases into the environment.
Law 7416, Convention on Biological Diversity and Annexes	Decision 14/3 of the Conference of the Parties 14	Biodiversity integration in the energy and mining, infrastructure, manufacturing, and processing sectors.
Law 7438, Basel Convention on the Transboundary Movements Control of Hazardous Wastes and their Disposal	Art. 4	Obligations to minimize the generation of hazardous wastes, ensure their proper management and regulate transboundary movements.
Law 6968, Convention against all forms of discrimination against women.	Art. 14	State obligation to pay attention to the special problems faced by women in rural areas.

Table 1. Summary of the legal framework related to ASGM in Costa Rica

Regulations	Article	Importance/ Relevance
	Art. 8	Establishment of mining reserve zones.
Mining Code Law 6797	Art. 8 bis.	Prohibits open-pit metal mining throughout the country.
and amendments (Law 8904 and Law 10132)	Art. 102	Prohibits the use of mercury and cyanide except for ASGM organized as cooperatives.
37225-MINAE and DE 29300-MINAE.	Transitory Provisions I, VIII, IX and X to Law 8904	Temporary authorization for the use of mercury and cyanide for ASGM.
Organic Law of the Environment, 7554	Art. 17 Art. 18	Requirement of an environmental impact assessment for human activities that alter or destroy environmental components or produce waste, toxic, or hazardous materials.
General Health Law, 5395.	Art. 239-244	Provisions for registration, storage and safe handling of hazardous products, and sanitary operating permits required by law.
Cooperative Associations Law, 6756	Art. 1, 2 and 3	Incorporation and operation of cooperatives.
National Emergency and Risk Prevention Law, 8488 of January 11, 2006 and regulation Decree 34361 of November 21, 2007.	Art. 13 and 14	Actions to reduce the causes of fatalities as well as the social, economic, and environmental consequences of anthropogenic and natural risk factors.
Organic Law of the College of Chemists of Costa Rica and of Chemical Engineers and Related Professionals, 8412	Art. 20	Requirement to have professionals supervise the use of chemical substances.

3. Mining and processing information

During 2016-2017, there were five exploration concession processes, three existing exploitation concessions, and one processing plant in the Abangares canton; however, none of these had production reports, so they were not considered active. (Departamento de Control Minero, Dirección de Geología y Minas, 2018). Only two of the active concessions corresponded to mining cooperatives associated with ASGM (Dirección de Geología y Minas, 2020).

In 2016, the DGM had 169 drag-stone mills in its inventory for the canton of Abangares, while the Municipality of Abangares had 260 registered as of May 2017 (Bogantes, 2021).

Depending on the available resources, the extracted material is ground with crushers and milled using ball mills, a Chilean mill, or a *rastras* used as a mill. Once ground, the material is distributed in *rastras* that are linked in series or independently, and mercury is added to amalgamate the gold content. Photograph I shows the equipment used in this process: the *rastras*, the ball mill and the Chilean mill.



Photograph 1. a) and b) Examples of *rastras* also used as mills, c) the ball mill (and d) the Chilean mill (bottom right photograph). Source: Field research conducted by the NAP team.

A small percentage of those involved in the activity have used screen or filter mesh, shaking tables, or concentrators to avoid raw material amalgamation. The formed amalgam is recovered from the processed material, and the excess mercury is manually squeezed out and separated from the gold using an adapted retort, which consists of a metal tube with a curved end and a lid; the linear section is directed into a container with cold water, as shown in photograph 2. The product of this separation is a low-carat sponge gold that can be sold as such or to which direct heat is applied to remove the remaining mercury and sold as dore.



Photograph 2: a) Retort detail, b) Close-up of the metal elbow with retort lid. Source: Field research conducted by the NAP team.

Tailings discarded from processing the material, referred to locally as *lamas*, are kept in pits dug directly into the ground at the processing plants without any impermeable liner material. These tailings are frequently marketed for cyanidation, even though they receive no treatment to remove the mercury.

4. Gold commercialization

The sponge gold (or dore in some cases) is marketed through various channels. At the time of this study, the Unión Cantonal de Asociaciones de Desarrollo de Abangares (UNCA-DA *for their Spanish acronym*) was temporarily authorized by the State for this activity. This organization purifies the sponge to dore, determines the carat, and purchases the material; however, it is estimated that they were only recovering 20% of the gold extracted from the area.

The gold marketing chain is complex. Currently, only companies with a concession for mining and processing can export gold with commercial value. However, the DGM does not have the authority to regulate, or issue permits to export scrap gold or industrialized gold (jewelry, gold recycled from electronic waste, colloidal gold, and others).

Gold exports accounted for approximately 10% of the value added in the mining and quarrying sector in 2015, 8.9% in 2016, 17.1% in 2017, 17% in 2018, and 16.5% in 2019; thus, quarrying accounts for the majority of the value added in this sector. However, the estimated contribution of gold mining in the country's economy could be underestimated, compared to production estimates.

5. Baseline estimates of the amount of mercury used in ASGM

The mercury used in ASGM in Abangares comes mainly from Nicaragua and Mexico, which enters Costa Rican territory illegally through the northern border and is sold on the black market at an unregulated price. The average price of mercury purchased for these purposes as of April 2021 is 35,000 colones (USD 57, with an average exchange rate of 615 colones per US dollar) per pound of mercury. There are no records of legal imports of mercury for mining purposes.

ASGM has an average mercury use of 476.6 g per rastra and in each complete process (from the first input of ore to discharge and recovery). In addition, the average use of mercury mass per mass of ore processed is 172.5 g/ton; that is, 172.5 g of mercury is used on average for every ton of ore processed. According to the results obtained, of the total mercury entering the system in each process, an average of 16.3% is lost in the sediments during the amalgamation phase.

The majority of the mercury loss is thought to happen in the tailings, while a tiny amount could also be lost during discharge (in pools, tanks, etc.) or even inside the rastra itself (on the floor of the rastra). In addition, it was determined that 94% of those who participated in this baseline estimate would be selling the tailings to a private cyanidation plant.

The average total mercury lost to the environment during gold ore processing was estimated at 16.7% (sediments and air). As for the average Hg:Au loss ratio, variable values were obtained between 1.8 and 24.6, for an average in the order of 12.3; which indicates that, for each gram of sponge gold recovered, an average of 12.3 g of mercury is lost to the environment.

The variability in the Hg:Au loss ratio identified during the research could be related to the characteristics of the ore processed, in terms of its content of clays, sulfides or other minerals that may affect a greater loss of mercury compared with the gold produced. However, an important aspect to consider is that the people involved in the processing of the material and amalgamation tend to use the same amount of mercury for each rastra that makes up their milling system; which is not usually modified according to the tonnage of ore processed, but they always apply the same amount of mercury per rastra and for each complete process, regardless of the amount of ore incorporated. There seems to be a directly proportional relationship between the Hg:Au loss ratio value and the amount of mercury used per ton of ore processed. That is, the higher the amount of mercury per ton of ore processed, the higher the Hg:Au loss ratio. This shows that, in the absence of a prior analysis of the gold content of the material, a standard amount of mercury is used due to routine, without any technical criteria.

According to studies conducted in this area for the year 2020, it is estimated that, for an annual production of 2,800 kg of gold per year, 34,400 kg of mercury are released into the environment, especially in the tailings. The following table shows a summary of the measurements taken.

	Parameter	Range	Average
	Use of mercury/ <i>rastra</i> / process	245.3 – 1,094.5 g	476.6
Mixing phase	Mercury lost in sediments with respect to total material entering the process.	4.5 – 30.3%	16.3%
Warm-up	Retort efficiency	56.9 – 100 %	89.6 %
phase	Percentage of mercury lost in the use of retort	0.02 – 1.6%	0.4 %
	Percentage of mercury released into the environment during processing	4.52 – 30.5%	16.7 %
	Hg:Au use ratio	1.8 – 24.6	12.3
Summdry	Amount of mercury entering the process per amount of gold recovered (as sponge)	18.3 – 99.2 g	46.8 g
	Average mercury used per ton of ore	69.1 - 300.7 g/Ton	172.5 g/ton

Table 2. Summary of results obtained in the mercury measurements

Source: Field research conducted by the NAP team.

This region contains three of the four worst ASGM practices that the Minamata Convention urgently wants to eradicate:

- Amalgamation of the raw material.
- Burning of amalgam in residential areas.
- Cyanide leaching in sediments, raw ore or rocks, to which mercury has been added, without first removing the mercury.

6. Socioeconomic characterization of the activity

The economy of the canton of Abangares revolves around artisanal gold mining. The 2011 population census indicates that 10 % of the population was directly engaged in artisanal mining production; however, other activities such as elementary occupations (34 %), sale of premises and direct service (19 %), as well as machinery operation and assembly (11 %) are linked to mining production; Over time, sub-activities have developed that provide complementary services to the activity, such as the sale of machinery and equipment, leasing of *rastras*, transportation services for the material to be processed, and a series of services required for the operation of the mining activity, for example, banking, financial and administrative services, food (supermarkets, restaurants, sodas) and agricultural and livestock services.

In the extraction and milling stages, the majority of participants are men of legal age, but there have also been cases of adolescents participating in the activity, especially within family structures. The participation of women is greater in the amalgamation stages (in many cases combined with domestic work and care of children) and the commercialization of the gold obtained. An unquantified population of irregular migrants was also detected. In total, it was estimated that 2,000 people may be involved in this activity.

The studies carried out indicated that, despite the fact that the activity is profitable for the people involved (it is estimated that each person obtains an average of 1,418 grams of gold per year, which, as of October 2021, were being sold at an average price of 19,331 colones (\$31.3) per gram, implying an average gross income per miner of 27.4 million colones per year or its equivalent of \$44,526.3), most of them lack medical and labor insurance due to the illegality of the work and the requirements of the respective institutions, exacerbated by the absence of a legal framework to formalize ASGM activities in development. The obligation to organize into mining cooperatives, imposed by the Aining Code (CM) and its reforms, is also not an option taken by most of those involved in the activity, due to a lack of knowledge about its proper functioning.

In the artisanal mining sector of Abangares, four profiles of people involved in ASGM have been identified, who may or may not be affiliated with a cooperative. Each of these types of people involved is described below:

- Owner of *rastras*, extracts the material, processes it and sells the gold directly.
- Does not own *rastras, extracts the material, processes it in a rented rastra and sells the gold* directly.
- Owner of *rastras,* extracts the material, processes it in its own *rastra a*nd sells the material directly, but also rents the rastra to other miners.
- Business profile, as it has several *rastras* to process its own material and has personnel in charge of it.

In addition, there are other key players that provide services in the sector, which are:

- People who own rental *rastras,* but do not process their own material.
- People who provide the material hauling service.
- Those who provide supplies legally or through the black market (machinery, tools, mercury and fulminating agents).
- Legal gold traders, such as UNCADA, and black-market buyers.
- Goldsmiths and jewelers.
- Professionals who provide advice to cooperatives and people involved in ASGM in general on legal and technical issues.
- Local companies that purchase mercury-contaminated tailings and process them with cyanide.

The educational level of men involved in ASGM is mostly elementary school (48%); in the case of their spouses or partners, it is higher, consisting mostly of high school education (34%). The majority of women involved in ASGM have completed high school (44%), which is higher than their partners or spouses, who mostly have incomplete elementary schooling (50%). The higher level of schooling of women miners and of their partners or spouses, in the case of male miners, is consistent with the observations made during field visits, where greater involvement in management was detected.

On average, those who engage in this activity have 2.1 children, the average age of their children is 17.9 years, and 53.2% have a scholarship to finance their studies. Children are generally involved in their parents' business from an early age.

In order to obtain more complete data on the number of people involved in ASGM, it is necessary to improve the conditions for the population to become involved and understand the benefits of carrying out the activity in a formal way, such as access to financing and an improvement in their quality of life. Formalizing the activity will also provide more precise information on the technology used, the socioeconomic circumstances of those participating, the amount of material processed, and the possible environmental, social, and economic impacts of the activity.

7. Environmental information

Regarding the environmental effects of the ASGM sector, there is evidence that the activity has had an impact on the environment in some areas of the physical area where it is developed, mostly in the air and sediment/soil.

The primary air pollution caused by the activity is related to mercury vapors released into the atmosphere when the amalgam is heated in the retort. The fact that some ASGM participants smelted their sponge gold before selling it should also be considered because mercury vapors and even other pollutants may be released into the environment under these conditions.

Although it is true that in recent years there has been a migration of processing plants to the outskirts of populated areas, in some cases the plants and, therefore, the retort burning or sponge gold smelting sites are located next to homes, so there would be greater exposure to gases by family members, inhabitants of these homes, or, if there are any, nearby neighbors.

Regarding sediment/soil contamination, it has been determined that the main loss of mercury into the environment in the mineral extraction processes (16.3% of the total mercury entering the system) is generated in the waste known as *lamas* (tailings). It can be concluded that the greatest contamination load from artisanal mining in the Abangares area is found in the tailings themselves.

According to the interviews conducted, approximately 94% of the people involved in this activity sell their tailings to an industrial plant in the sector, which collects the largest volume of tailings generated in ASGM. Also, apparently, this plant processes the tailings using cyanide to extract the residual gold, even though it was previously processed with mercury. As for the use of cyanide for processing mercury-containing tailings, this is an environmentally harmful practice, because bioavailable mercury and cyanide compounds could be generated; it is also not a profitable practice from an economic point of view, since it makes the recovery process less efficient, because, when mercury is present in the sediment, it competes with cyanide in the gold extraction process, which means that more cyanide must be used, making the process more expensive. Those who do not sell their tailings to the plant in question store them on their properties and arrange them in relatively low mounds with varying lateral extensions, depending on the availability of space on the land.

Infiltration of heavy metals that could affect groundwater is not ruled out, since tailing piles are excavated directly in the soil or saprolite and are not waterproofed prior to receiving tailings.

8. Health information

The institutional capacity of the health sector to attend to the needs of the people involved in ASGM resides in the two Health Areas (Abangares and Colorado), which are in charge of seven Basic Integrated Health Care Teams (EBAIS). The designated hospital for the territory is the Enrique Baltodano Briceño Hospital, which is approximately 90 kilometers away, an hour's drive by motorized transport. Services related to environmental health regulation and surveillance are administered by the Abangares Area Health Authority (ARS for its Spanish acronym) of the Ministry of Health.

The first and second-level services have the human and technical resources to respond to the needs of the population. However, in the case of technical resources, laboratory testing for mercury is not available at the local or regional level (samples must be transferred to the third level of care, located outside the region), and there is no specialty in neurology and no professional in the area of toxicology or environmental health directly linked to the services considered. There are also no medications to treat acute intoxications from chemicals such as mercury and cyanide at the local or regional level.

The epidemiological analysis does not include people related to ASGM; there is no stratification or focus on the groups of people directly exposed to mining and their families, or on those with vulnerable conditions who could be exposed, such as pregnant women and minors. In practice, the risks associated with ASGM are not sufficiently focused on, due to the illegal nature of a large part of the mining activity and also, because the epidemiological problem and the way to act have not been measured.

A rapid health assessment of people involved in ASGM (RHA) shows that the area has higher incidence rates of possible diseases related to mercury exposure (such as bipolar affective disorder, arterial hypertension, pneumonia, acute respiratory infections, and cancer) than the regional and national average, as shown in the following table.

Event	Incidence rates year 2015			
Eveni	Abangares	Regional	National	
Bipolar affective disorder	5.19	0.82	1.74	
Arterial hypertension	347.76	237.73	297.61	
Pneumonia	145.33	76.6	48.92	
Severe respiratory infections	5.19	5.47	33.69	
Acute respiratory infections	64.96	32.75	28.47	
Other types of cancer	20.96	26.68	80.75	

Table 3. Incidence rates of possible diseases related to mercury exposure in Abangares, ChorotegaRegion and Costa Rica per 100,000 inhabitants, in 2015.

Source: Ministry of Health, 2015.

A similar trend is shown in the comparison of the percentage of students with access and curricular adaptations in the canton of Abangares, Chorotega Region and Costa Rica for the year 2018, which suggests cognitive effects in the population of Abangares.

Event	Percentage of students			
Eveni	Abangares	Regional	National	
Disability or condition	27.20%	20.80%	21.90%	
Non-significant adjustments	30.70%	12.90%	14.40%	
Significant adjustments	7.80%	4.10%	2.20%	

Table 4. Comparison of percentage of students with accessibility accommodations and curricula of the canton of Abangares, Chorotega Region and Costa Rica for the year 2018.

Source: Ministry of Public Education, 2020.

However, further studies are needed to determine any causal association with mercury use.

III. NATIONAL OBJECTIVE AND REDUCTION TARGETS.

Considering all the issues mentioned above, the National Action Plan's national goal is defined as follows:

1. National Objective

Reduce and, as far as possible, eliminate the use of mercury in artisanal and small scale gold mining in Costa Rica to protect health and the environment, by providing advice and technical assistance to the people involved in the mining activity in the Abangares area, according to the responsibilities established by national regulations that allow the elimination of the bad practices present in the activity described in the Minamata Convention.

In order to achieve this national objective, the following reduction targets are proposed:

Reduction target: reduce ASGM mercury emissions and releases to 50% of baseline from the current annual average estimate of 34.4 MT of mercury per year by 2028 and a 100% reduction by 2030.

2. Strategies and goals of the National Action Plan

Given the need to integrate all stakeholders involved in ASGM into the National Action Plan and the importance of prioritizing actions that will allow for the implementation of the Minamata Convention in Costa Rica, the following strategic axes were determined, using Annex C of the Convention as a guide:



Figure 1. Strategies of the National ASGM Plan for Costa Rica.

IV. IMPLEMENTATION STRATEGIES

1. Steps to facilitate the formalization of ASGM

The purpose of these measures is to encourage people engaged in ASGM in Costa Rica to formalize their gold extraction activity with the objective of achieving legal certainty for the mining sector and an adequate process of oversight of this activity under a program that facilitates the process.

Strategy 1	Facilitate formalization of ASGM			
Main objective	Promote that people engaged in ASGM (men and women) formalize their exploitation, processing, and commercialization activities in accordance with regulations that facilitate this process.			
Specific objective	Action			
1.1 Review and strengthen the	1.1.1	Update the regulations, procedures, and instruments for the formalization/regulation of ASGM through a reform of the Mining Code that adjusts to the reality of the sector.		
aimed at the formalization and regularization of	1.1.2	Determine the conditions for granting exploitation and processing/ beneficiation concessions to people engaged in ASGM activities and, when required, promote the participation of women.		
people engaged in ASGM gold activities.	1.1.3	Evaluate the forms of organization aimed at people engaged in ASGM activities, enabling them to obtain concessions and exploit them in an environmentally sound manner.		
	1.2.1	Strengthen the expert teams working for the government organizations engaged in mining in the ASGM sector.		
	1.2.2	Create an amnesty (avoid administrative and other sanctions for those who have engaged irregular activities in the absence of a concession). Set deadlines for submitting to the regularization process and the associated repercussions for those who do not submit to it or whose applications are denied for any reason.		
1.2 Develop and strengthen the institutional framework	1.2.3	Determine the environmental impact assessment instrument that should be applicable to ongoing/operational ASGM activities (mining remedial environmental management instrument or other terminology) and new ones.		
formalization and regularization of ASGM gold activities.	1.2.4	Establish legal and inter-institutional coordination actions to issue other permits necessary for the activity, such as sanitary operating permits and municipal licenses, among others.		
Ū	1.2.5	Conduct a mining census (with information disaggregated by sex and indicating the type of technology used) that is periodically updated or incorporated into the national population census.		
	1.2.6	Develop a special tax regime for the ASGM sector in Abangares that contributes to the formalization of miners.		
	1.2.7	Develop a special contributory social security system for the ASGM sector in Abangares that contributes to the formalization of the people involved.		
1.3 Develop managerial skills in	1.3.1	Accompany, strengthen and train the leaders of ASGM mining cooperatives in administrative, managerial and organizational issues related to the cooperatives, for their formation, start-up and consolidation, encouraging the participation of women from the community.		
gold ASGM.	1.3.2	Provide support in the management of credit lines under special conditions to finance the technological change processes of ASGM cooperatives. (Including studies for mining concessions, equipment purchases, and other) mercury-free technologies.		

2. Strategies to eliminate worst practices and reduce emissions, releases and exposure risks

As stated in point I(b) of Annex C of the Minamata Convention, the worst practices to be eliminated in the artisanal gold mining process are:

- Amalgamation of raw ore.
- Exposed burning of amalgam or processed amalgam.
- Burning of amalgam in residential areas.
- Cyanide leaches from sediments, raw ores, or rocks to which mercury has been added without first removing the mercury.

In turn, the measures proposed to eliminate these practices indicate a reduction in emissions, releases, and the risks of exposure to mercury because they are aimed at improving the processing of the material and the implementation of new technologies to reduce or eliminate the use of mercury, as well as the training of those involved. Since the actions suggested in both sections are intended to reduce the use of mercury in ASGM processes through the same actions and involve the same institutional actors, they are merged with the strategies to promote the reduction of emissions due to the close relationship between both types of strategies.

Strategy 2	Eliminating worst practices and reducing emissions, releases, and exposure risks		
Main objective	Encourage ASGM miners to use alternative mercury-free gold extraction methods or technologies, thereby eliminating the ASGM industry's worst mercury-using practices.		
Specific objective		Action	
	2.1.1	Design and finance a pilot project with mercury-free technology to determine the yields and profitability of the technological change with at least one of the organized cooperatives in Abangares, through an agreement that allows the equipment to remain in place.	
2.1 Promote the adoption of efficient technologies for gold extraction and processing that are	2.1.2	Design and implement a training package for leaders of ASGM cooperatives in Abangares on mercury-free technological alternatives, in order to encourage their adoption in the short and medium terms, with equal participation by women.	
free of mercury.	mercury.	Promote the implementation in the ASM sector of practices aimed at the application of mercury-free techniques, such as gravimetry, flotation, cyanidation, and others, through alliances with non- governmental or similar organizations that are leaders in the field at the international level.	

Strategy 2		Eliminating worst practices and reducing emissions, releases, and exposure risks		
2.2 Control and eradicate cvanidation	2.2.1	Promote a decrease in the production of mercury-contaminated tailings by storing mercury-free tailings separately from mercury-contaminated ones.		
in the processing of mercury-	2.2.2	Determine the number of mercury-contaminated tailings through a national inventory of tailings as environmental liabilities.		
contaminated tailings.	2.2.3	Promote the decontamination of mercury-containing tailings through agreements with universities, local companies, or others.		
	2.3.1	Create and implement a continuous training and technical assistance program for miners that covers topics like mining standards and regularization processes, extraction techniques, new technologies, environmental aspects, occupational safety and health, and so on.		
2.3 Review and	2.3.2	Promote scientific research for mining purposes in the ASGM sector.		
strengthen the management of areas	2.3.3	Study the potential contamination generated in the purchasing and smelting centers of the dore produced by the ASGM sector miners.		
ASGM gold activities.	2.3.4	Study the potential contamination by acid drainage generated at the main ASGM mineral extraction sites.		
	2.3.5	Evaluate the possible generation and potential environmental impact of bioavailable cyanide and mercury compounds within the ASGM area.		

3. Strategies for managing trade and preventing diversion of mercury and mercury compounds

The establishment of a control system will make it possible to clearly determine the quality and quantity of gold exported, generating reliable statistics as well as a review of the supply chain, in order to comply with international standards established by countries such as the USA, Canada, and the United Kingdom, the country's major trading partners, and where there is an opportunity for the country to grow in value-added gold exports.

Strategy 3	Strategies to manage trade and prevent mercury diversion			
Main objective	Strengthen the control and monitoring system for mercury trade and use.			
Specific objective	Action			
	3.1.1	Regulate, through an executive decree, the sale and use of mercury and cyanide.		
3.1 Review and update the regulatory framework regarding the restriction of the use of mercury in mining activities	3.1.2	Establish a control system to clearly determine the quality and quantity of gold exported (preparation and application of technical notes by DGM), as well as the import of mercury, generating reliable statistics and a review of the supply chain, in order to comply with international standards established by countries such as the USA, Canada, and the United Kingdom, which are the country's major trading partners and where there is an opportunity for the country to grow in value-added gold exports.		
denvines.	3.1.3	Update Costa Rican legislation and the required reforms regarding the commercialization of gold locally and internationally, as well as the competencies of each related entity, in order to establish clear rules that facilitate the control, purchase, and sale of gold in the national and international markets.		
3.2 Determine the quality and quantity of gold exported, as	3.2.1	Write a Technical Note for mercury imports into the Minamata Convention, in order to regulate domestic and international commercialization and get sufficient traceability.		
well as the import of mercury, generating reliable statistics.	3.2.2	Write a Technical Note for the export of gold in accordance with the Mining Code, to regulate domestic and international trade and obtain sufficient traceability.		

4. Strategies for involving stakeholders in the implementation and continuing development of the plan

Strategy 4	Stakeholder for involving stakeholders in the implementation and continuing development of the National Action Plan		
Main objective	Develop capacities and means for dialogue, communication and training of people involved in ASGM		
Specific objective		Action	
4.1 Institutionalize dialogue between the	4.1.1	Develop a database of mining organizations established formally or informally (where participation is disaggregated by gender and visible), with which there is the possibility of establishing communication and dialogue processes.	
relevant parties within ASGM, with an emphasis	4.1.2	Ensure representation of the mining sector (men and women) within the sector's commissions.	
such as the Municipal Mining Commission and	4.1.3	Promote spaces for dialogue and communication with the necessary materials and equipment.	
the cooperatives.	4.1.4	Develop annual work plans with those mining organizations seeking dialogue as well as the dissemination of information in conjunction with the Executive Branch.	

5. Public health regulation to minimize exposure to mercury

Health care centered on ASGM risks is promoted, beginning with increased access to social security and follow-up medical care for exposed individuals and patients. Biosurveillance of mercury exposure and the strengthening of biomedical data registries are essential for timely diagnosis and clinical follow-up, as well as for epidemiological risk analysis.

Strategy 5	Public health regulation to minimize mercury exposure	
Main objective	Strengthen environmental health regulation to control pollution and exposures associated with ASGM.	
Specific objective	Action	
5.1 Environmental health management (EMS) in workplaces.	5.1.1	Design EMS to reduce contamination and exposure in the workplace.
	5.1.2	Design and implement a training program for the use of PPE.
	5.1.3	Evaluate the management of ASGM workplaces to reduce contamination and exposure (during extraction and processing), considering physical plant conditioning and the use of PPE.
5.2 Design, implement and evaluate Water Security Plans (WSPs).	5.2.1	Diagnose water quality and identify Critical Control Points.
	5.2.2	Design and implement WSP.
5.3 Develop the environmental health component as part of the regulatory plan and derived regulations.	5.3.1	Incorporate data, information, and knowledge on pollution associated with ASGM and its control as part of the regulatory plan.
	5.3.2	Incorporate environmental pollution control criteria associated with ASGM as part of urban development regulations.
5.4 Promote the integrated management of hazardous solid waste from ASGM activities (wool used in the process, mercury containers, sacks used to transport materials, among others that are identified in the assessment).	5.4.1	Diagnose the situation of generation and disposal of hazardous solid waste associated with ASGM.
	5.4.2	Evaluate the management for the control of hazardous solid waste associated with ASGM.
5.5 Manage an environmental health education program to reduce contamination and exposure to mercury and other pollutants in ASGM.	5.5.1	Design an environmental health education program focused on the risks associated with ASGM.
	5.5.2	Manage an environmental health education program focused on the risks associated with ASGM.

6. Strategies to prevent exposure of vulnerable populations to mercury through epidemiological analysis (exposure to mercury and other health risk factors (RF) in ASGM).

It is deemed crucial to produce guidelines and manuals focusing on the use of good mining and environmental practices in the ASGM sector in order to homogenize the technical requirements in the activity. The technical teams in charge of developing these instruments should be made up of qualified personnel from the institutions involved; in addition, the incorporation of specialized private consultants to these teams can be considered. Furthermore, the institutions in charge should have sufficient financial resources to implement this initiative.

As these policies and guides are put into practice, adjustments can be made based on lessons learned by those participating in ASGM.

Strategy 6	Prevent exposure of vulnerable populations to mercury through epidemiological analysis (exposure to mercury and other health risk factors (RF) in ASGM).		
Main objective	Strengthen the epidemiological analysis to understand the contamination-exposure-vulnerability-susceptibility and risk process associated with ASGM and formalize their exploitation and processing activities, in accordance with regulations that facilitate this process.		
Specific objective	Action		
6.1 Diagnose exposure to mercury and other chemical, biological and physical agents, as well as estimate administered doses.	6.1.1	Assess mercury exposure doses according to environmental matrix.	
	6.1.2	Assess exposure doses to other agents of interest.	
	6.1.3	Communicate results of the diagnosis of environmental exposure.	
6.2 Diagnose the social vulnerability of the mining population, their families and communities.	6.2.1	Diagnose the social vulnerability of the mining population, families and community in terms of socio-demographic conditions, living conditions, access to resources and food.	
	6.2.2	Share the report on social vulnerability.	
6.3 Diagnose the susceptibility of the mining population, their families and communities.	6.3.1	Diagnose the susceptibility of the mining population, their families and communities.	
	6.3.2	Share the susceptibility report.	
6.4 Analyze the risk of illness attributable to exposure to mercury and other hazardous agents.	6.4.1	To analyze the risk of illness attributable to mercury exposure in the workplace and environment.	
	6.4.2	Analyze the risk of illness attributable to exposure to other hazardous agents.	
	6.4.3	Share the report on risk of illness attributable to exposure to mercury and other hazardous agents.	

Strategy 6	Prevent exposure of vulnerable populations to mercury through epidemiological analysis (exposure to mercury and other health risk factors (RF) in ASGM).		
6.5 Develop a feasibility and viability study of an Epidemiological Surveillance System (ESS)	6.5.1	Implement a feasibility and viability study of an ESS on the health effects of mercury.	
	6.5.2	Design an ESS for the risks associated with mercury exposure in ASGM.	
on the health effects of	6.5.3	Implement ESS for the risks associated with mercury exposure.	
mercury.	6.5.4	Preliminary evaluation of the ESS on mercury exposure and risks.	
6.6 Promote access to health insurance for all miners and their families.	6.6.1	Make a diagnosis of the situation of access to health insurance for the mining population and their families.	
	6.6.2	Promote access to health insurance through social communication actions.	
6.7 Strengthen diagnostic capacity for mercury exposure and associated diseases.	6.7.1	Develop a biological surveillance program for miners and their families.	
	6.7.2	Provide medical follow-up to potentially exposed individuals (miners and family members) in order to detect pathologies associated with ASGM exposure early.	
6.8 Strengthen the recording of clinical and socio-demographic information based on the follow-up of the mining population, family members and patients.	6.8.1	Manage a computerized system for recording clinical and sociodemographic information.	
	6.8.2	Train personnel in charge of recording clinical and sociodemographic information.	
6.9 Promote health and prevent diseases associated with ASGM exposure.	6.9.1	Design and manage a health education program focused on the target population.	
	6.9.2	Manage a health education program focused on the target population.	

7. Strategies for providing information to miners

Strategy 7	7. Providing information to artisanal and small scale gold miners and affected communities.		
Main objective	Developing capacities and means for dialogue, communication and training of people involved in ASGM		
Specific objective	Action		
7.1 Provide baseline information for miners and their communities.	7.1.1	Develop a communication strategy during the formalization process that facilitates dialogue between the leaders of the mining cooperatives and the competent State entities, in order to facilitate the establishment of agreements and commitments, as well as their compliance.	
	7.1.2	Develop guidelines and manuals on good mining and environmental practices for ASGM.	

8. Additional strategies: encourage market mechanisms that favor sustainably mined gold.

The goal is to encourage the pursuit of commercial opportunities that enable those involved in the Abangares ASGM to add value to the gold they extract. For example, the separation of the gold from the silver and other minerals, which raises the sale price, and the local production of jewelry or the creation of beneficial connections with businesspeople or organizations in other parts of the nation.

Strategy 8	Encourage market mechanisms that favor gold mined with sustainable practices.			
Main objective	To provide recognition and added value to ASGM at the national level.			
Specific objective	Action			
8.1 Promote the search for business alternatives that will allow artisanal miners in Abangares to provide added value.	8.1.1	Promote the search for business alternatives that allow the artisanal miners of Abangares to provide added value to the gold they extract, such as separating the gold from the silver and other minerals, which increases the sale price, as well as the production of jewelry locally or the generation of productive linkages with entrepreneurs or companies in other regions of the country.		
	8.1.2	Encourage international accreditation to distinguish Costa Rican ASGM gold on the world market.		
8.2 To reflect the contribution of ASGM to the national economy.	8.2.1	Promote the revision of the system for calculating the value added, estimated by the Central Bank of Costa Rica, generated by the gold mining sector, including artisanal mining in the country, so that it reflects in a more comprehensive manner the sector's contribution to the national economy.		

The full details of the National Action Plan for Artisanal and Small scale Gold Mining in Costa Rica, in accordance with the Minamata Convention on Mercury, can be found at the following web address:

www. digeca.go.cr





