

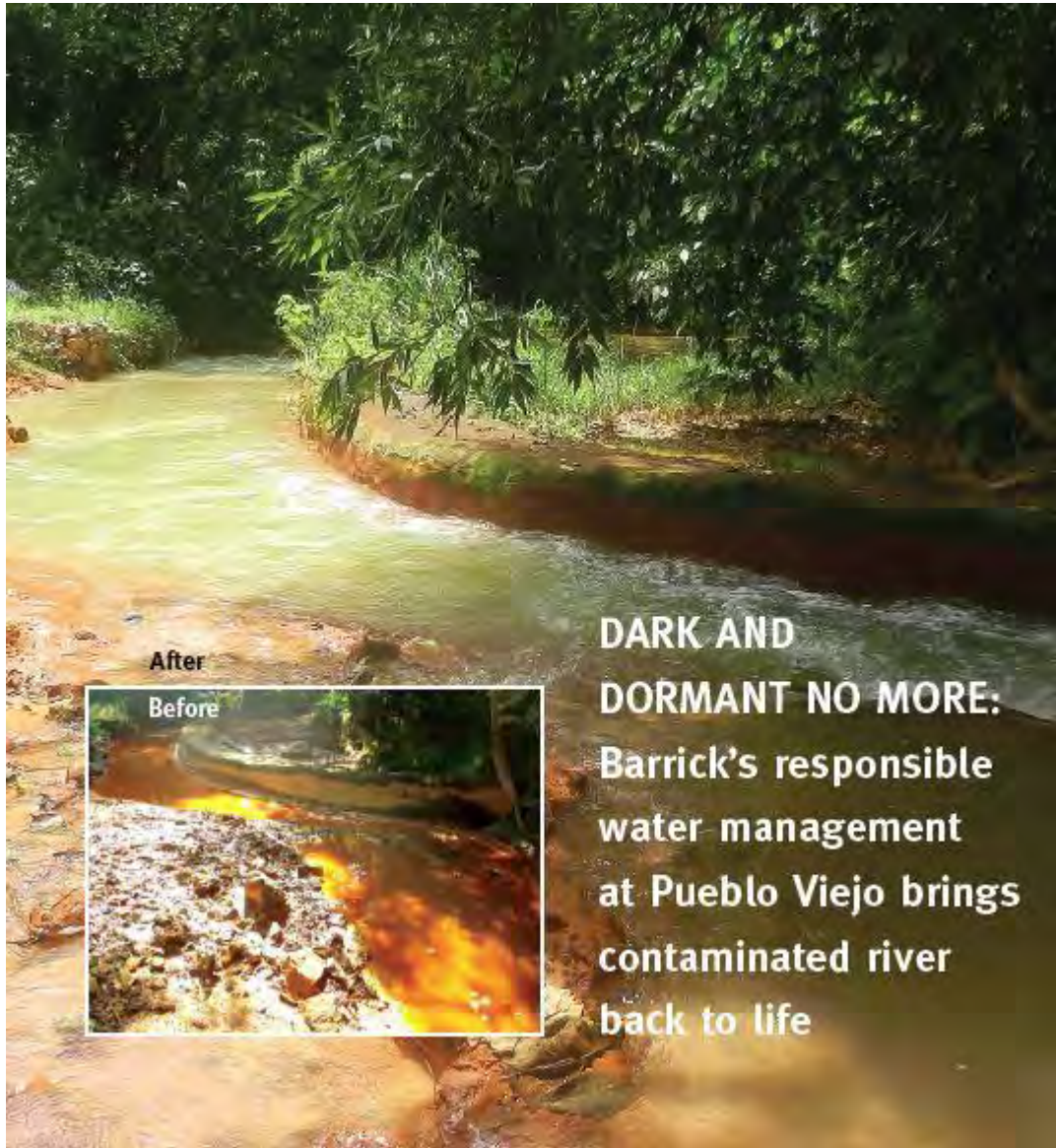


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*Dramatic Improvements at Margajita River  
at Pueblo Viejo Gold Mine*

Carlos Tamayo, MBA, PhD, PE  
Environmental Manager





- Background
- Legacy of Environmental issues
- ETP Overview
- Dramatic Results



# Pueblo Viejo DOMINICAN REPUBLIC

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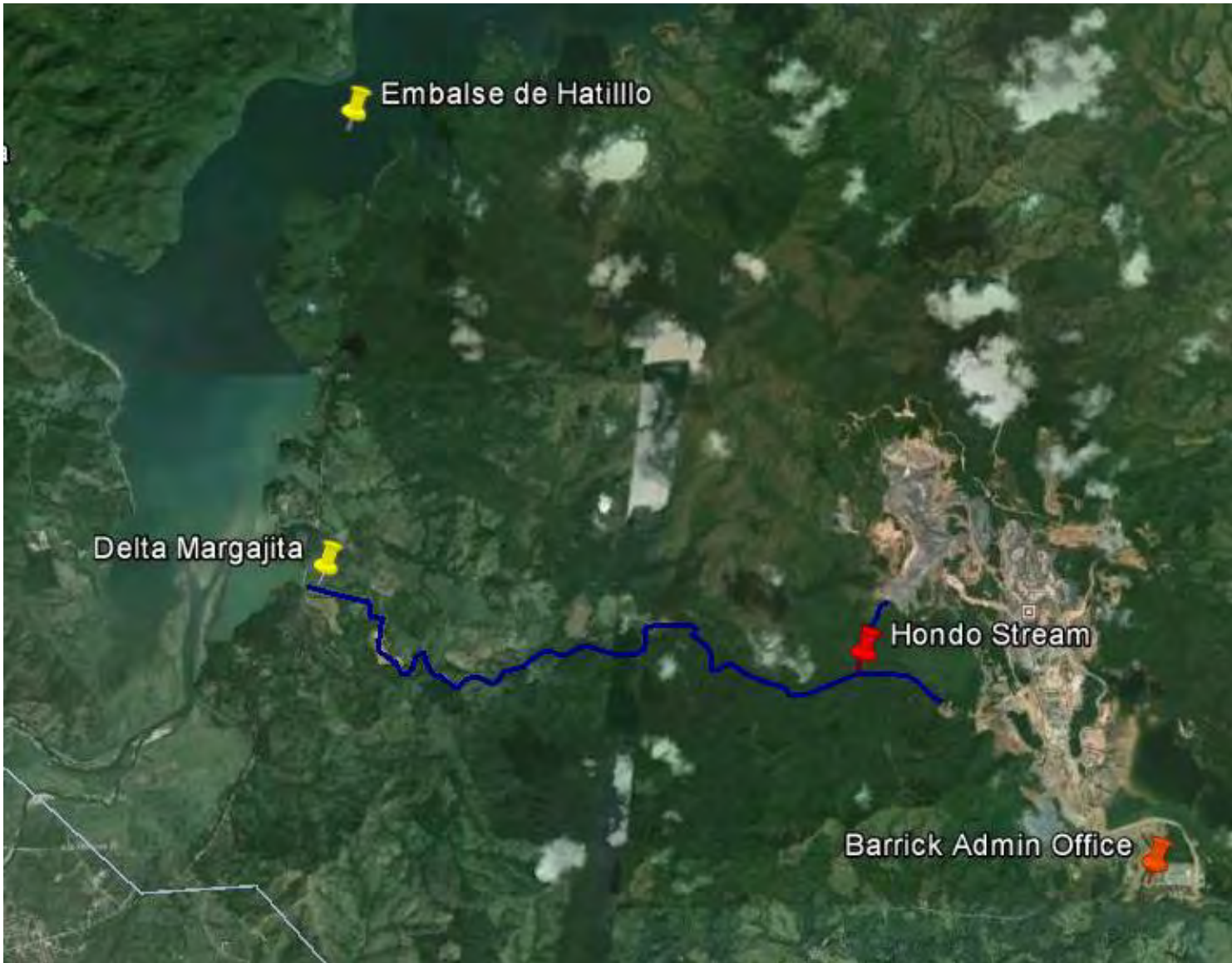


# Location





# Location





# PV Background & History



- First Mining Camp of the new world (Circa 1510-1530)
- Rosario Dominicana operated from 1975 -1999
- In 2001, the DR Government called for an international tender of PV Mining rights and to remediate environmental liabilities
- Barrick Gold Corporation assumed Pueblo Viejo Project responsibilities in 2006 (Placer Dome)



# Rosario Environmental Legacy



- Rosario Dominicana operated for 25 years.
- Poor mining practices derived in acid drainage contamination of nearby land and streams.
- Remediation of historical contamination is responsibility of DR State.



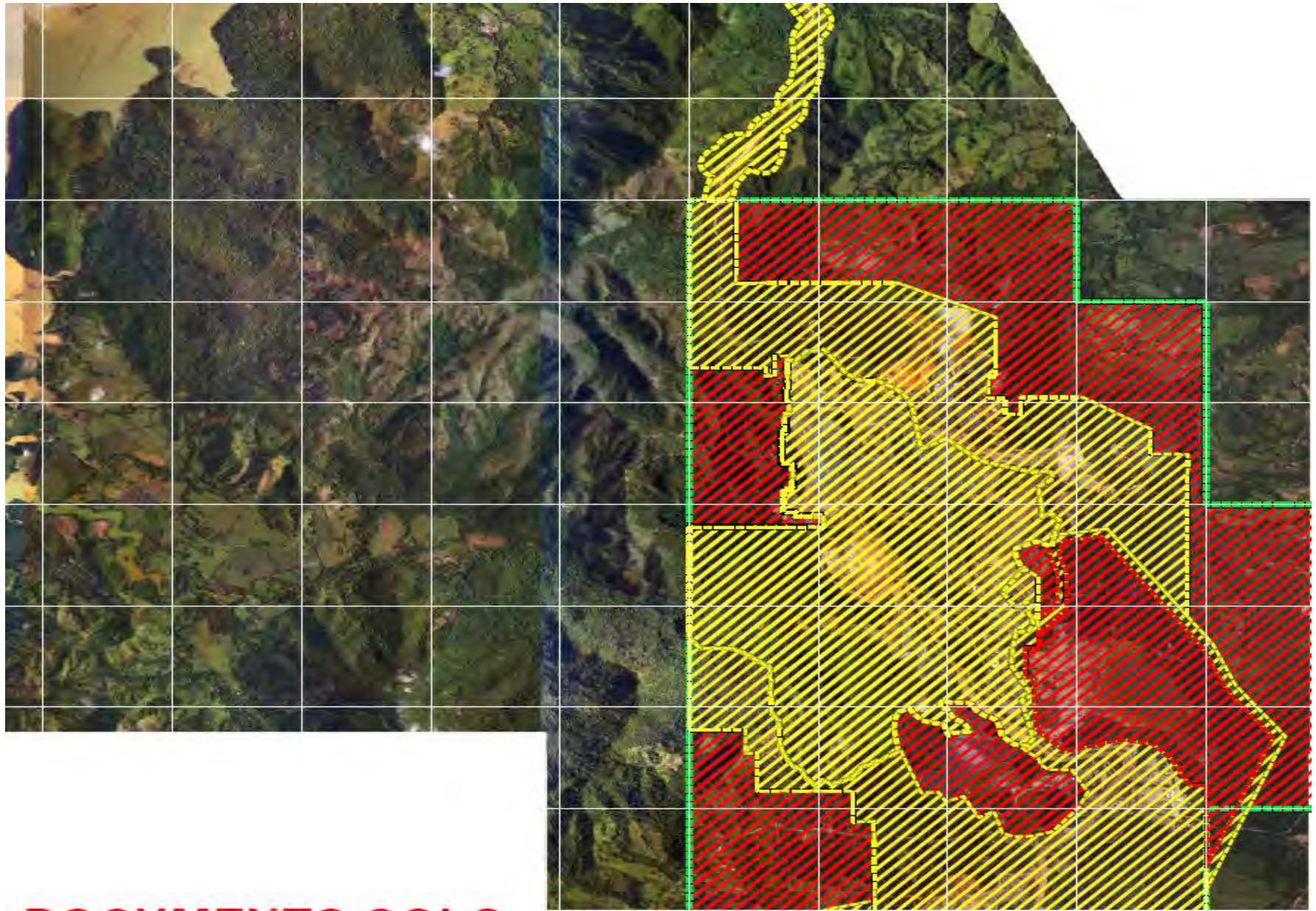


# Legacy Environmental Issues





# Legacy Environmental Issues







- **Margajita Stream and Hatillo Reservoir** have been most negatively impacted with ARD and heavy metals
- Under SLA of Mining Rights, Barrick committed to remediate some historically impacted areas.
- Other areas remain under DR **Government's** responsibility (PVDC committed **\$75 M** to fund some DR Government remediation costs).



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Pueblo Viejo Dominicana Corporation (PVDC)  
Joint Venture Barrick 60/40 Goldcorp  
2006 - Present







**\$3.7B** in mine construction capital

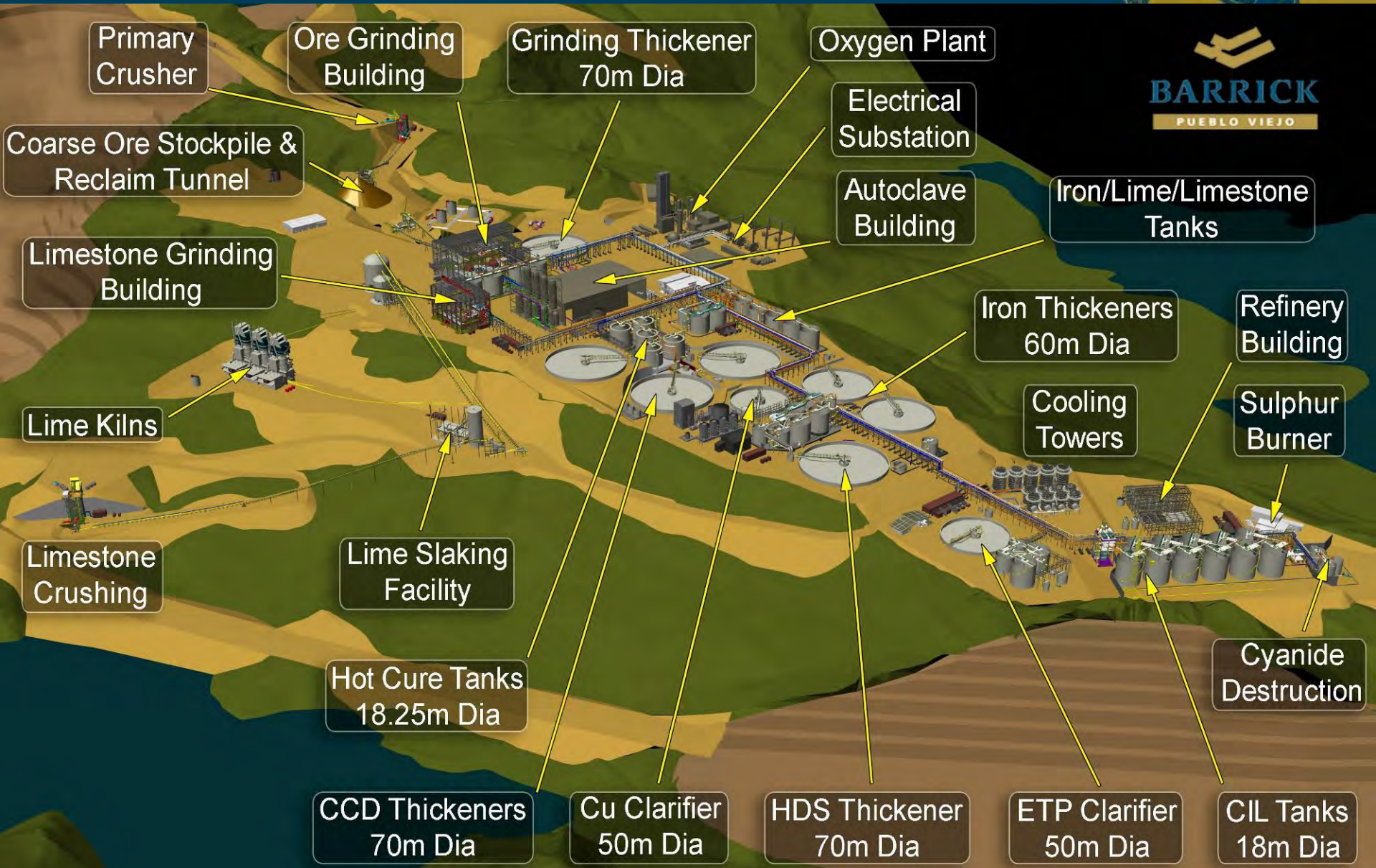
**+26** years mine life

**16M** oz reserves

**0.813M** oz of production in 2013

**1.0-1.1** M oz of production in first five years

# Site Overview







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Collection and Treatment  
of Mining-Influenced  
Water





# Division of Responsibilities





# PVDC Water Management Plan





# Proposed DR State Water Mgmt.

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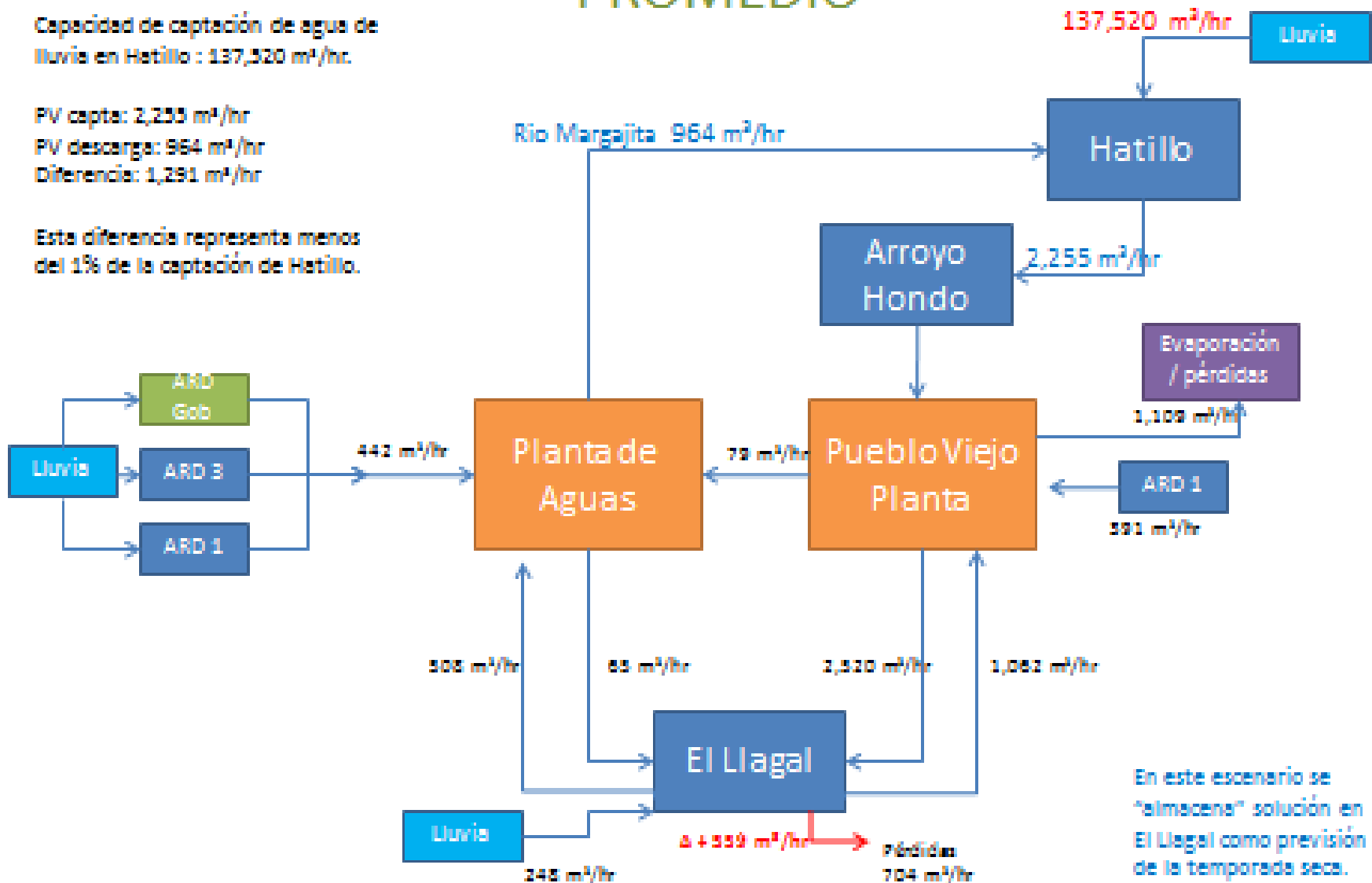
# PVDC Water Balance



Capacidad de captación de agua de lluvia en Hatillo : 137,520 m<sup>3</sup>/hr.

PV capta: 2,255 m<sup>3</sup>/hr  
 PV descarga: 964 m<sup>3</sup>/hr  
 Diferencia: 1,291 m<sup>3</sup>/hr

Esta diferencia representa menos del 1% de la captación de Hatillo.



En este escenario se "almacena" solución en El Llagal como previsión de la temporada seca.

# Capture & Controlled ARD





# Water Consumption (m<sup>3</sup>/hr)



■ Hatillo	ARD1	ARD3	Reclaim W	Margajita
2500	300-1700	24-485	1800	1581



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# Effluent Treatment Plant (ETP)





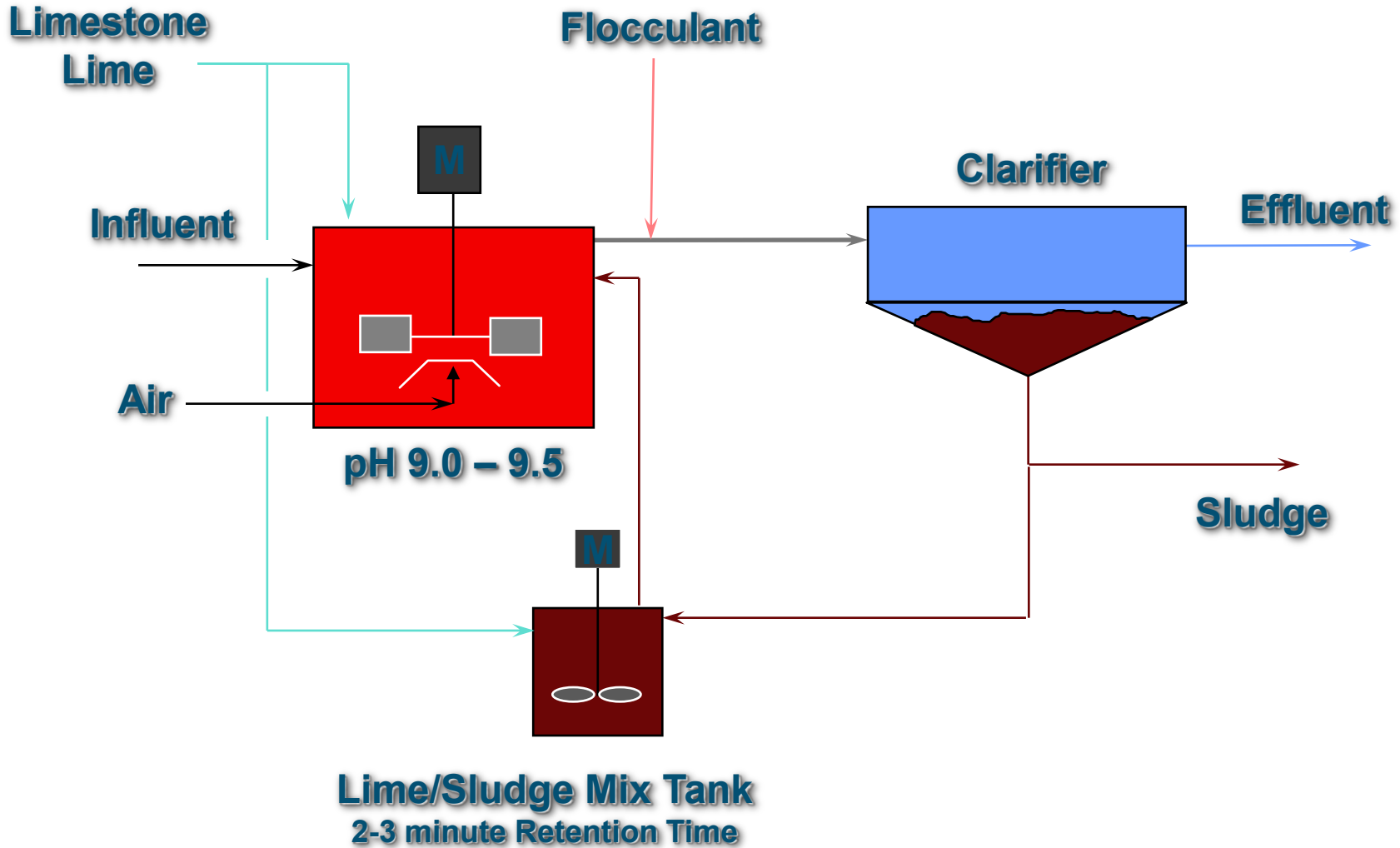
# ETP Precipitation of Metals and Neutralization of Acids



ETP designed as a standard High Density Sludge (HDS) plant.

Dissolved metal sulphates and acid are collected into the CCD overflow, and subsequently neutralized and/or precipitated in a high density sludge (HDS) process using limestone and lime to precipitate metals as metal hydroxides.

# High Density Sludge (HDS) Process





# Precipitation of Metals and Neutralization of Acids



- Water is pumped to two limestone reactor tanks (40 ft Diam) and the slurry overflows into lime reactor tanks (36 ft Diam)
  - All tanks equipped with mechanical agitators

# Precipitation of Metals and Neutralization of Acids



Overflow lime tanks gravity flows to a conventional clarifier (150 ft)  
Solid/liquid separation

The clarifier tank will be used to separate the treated water from the  
treatment sludge



# ETP Discharge to Margajita



ETP effluent after solid/liquid separation in the clarifier gravity flows to the final discharge point. Environmental compliance samples taken





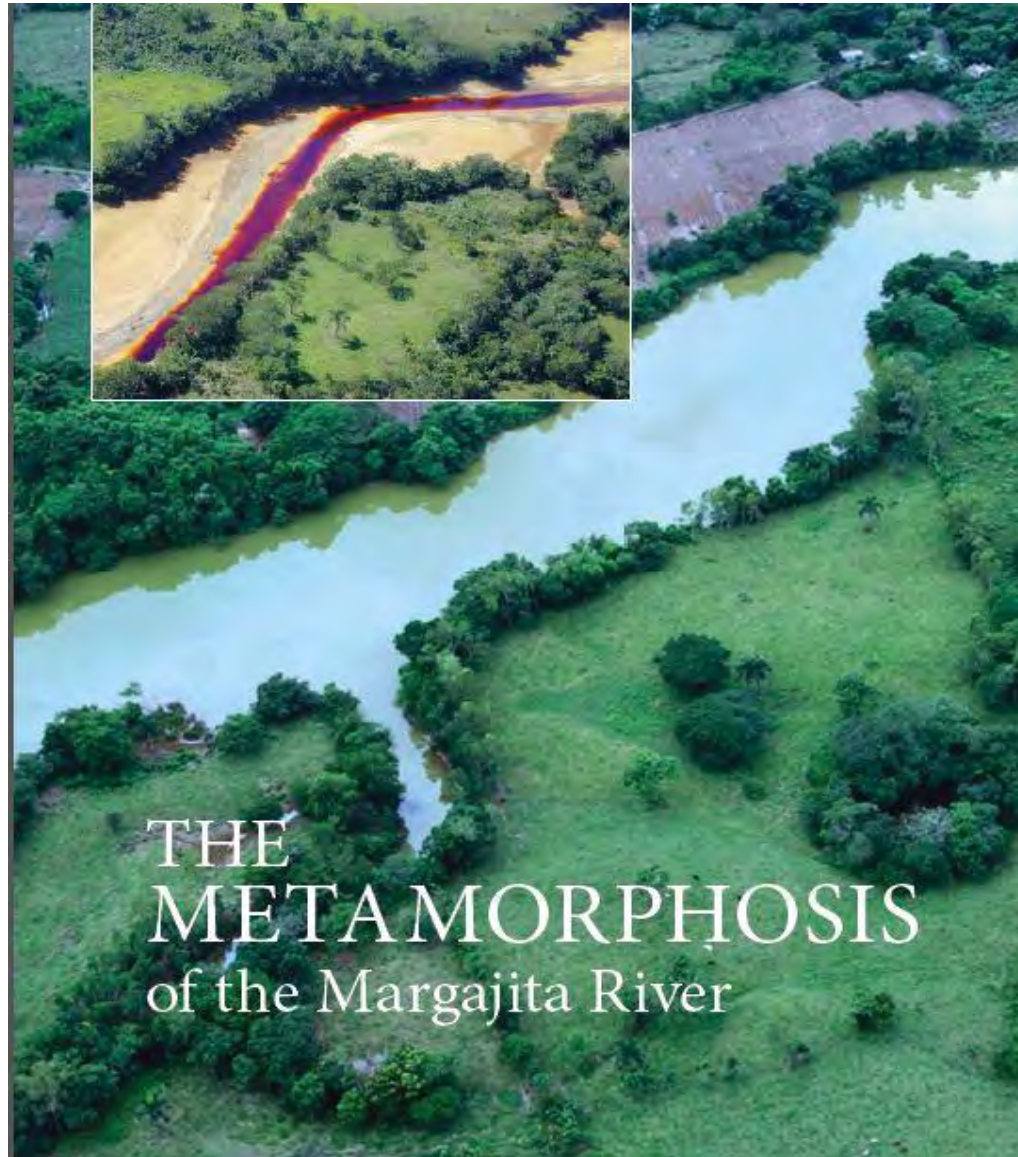
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# Dramatic Improvements





# Positive Effects



THE  
METAMORPHOSIS  
of the Margajita River

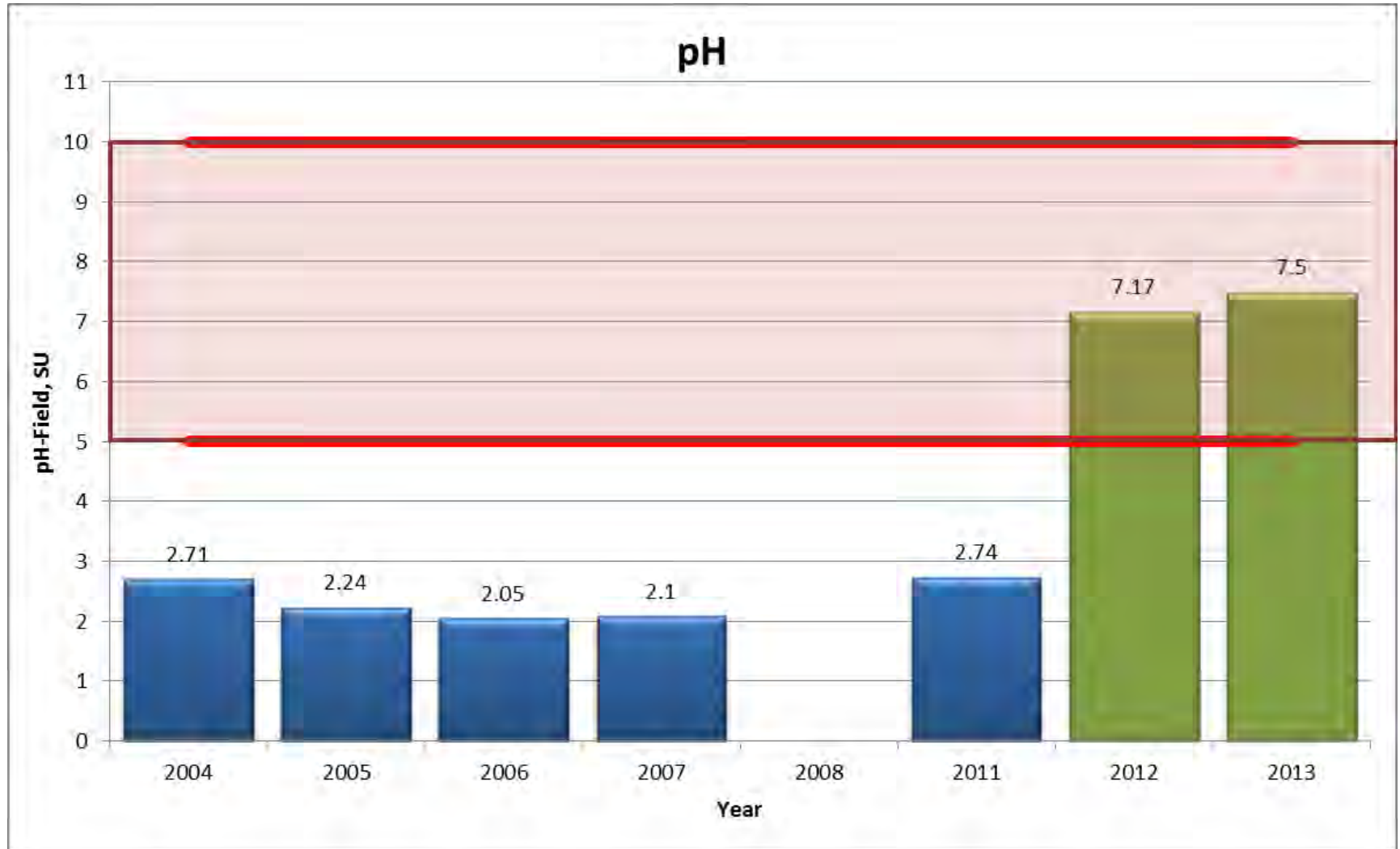


The ETP plant is removing heavy metals to acceptable concentrations  
(As, Cr, Cu, Fe, Pb, Ni, Zn)

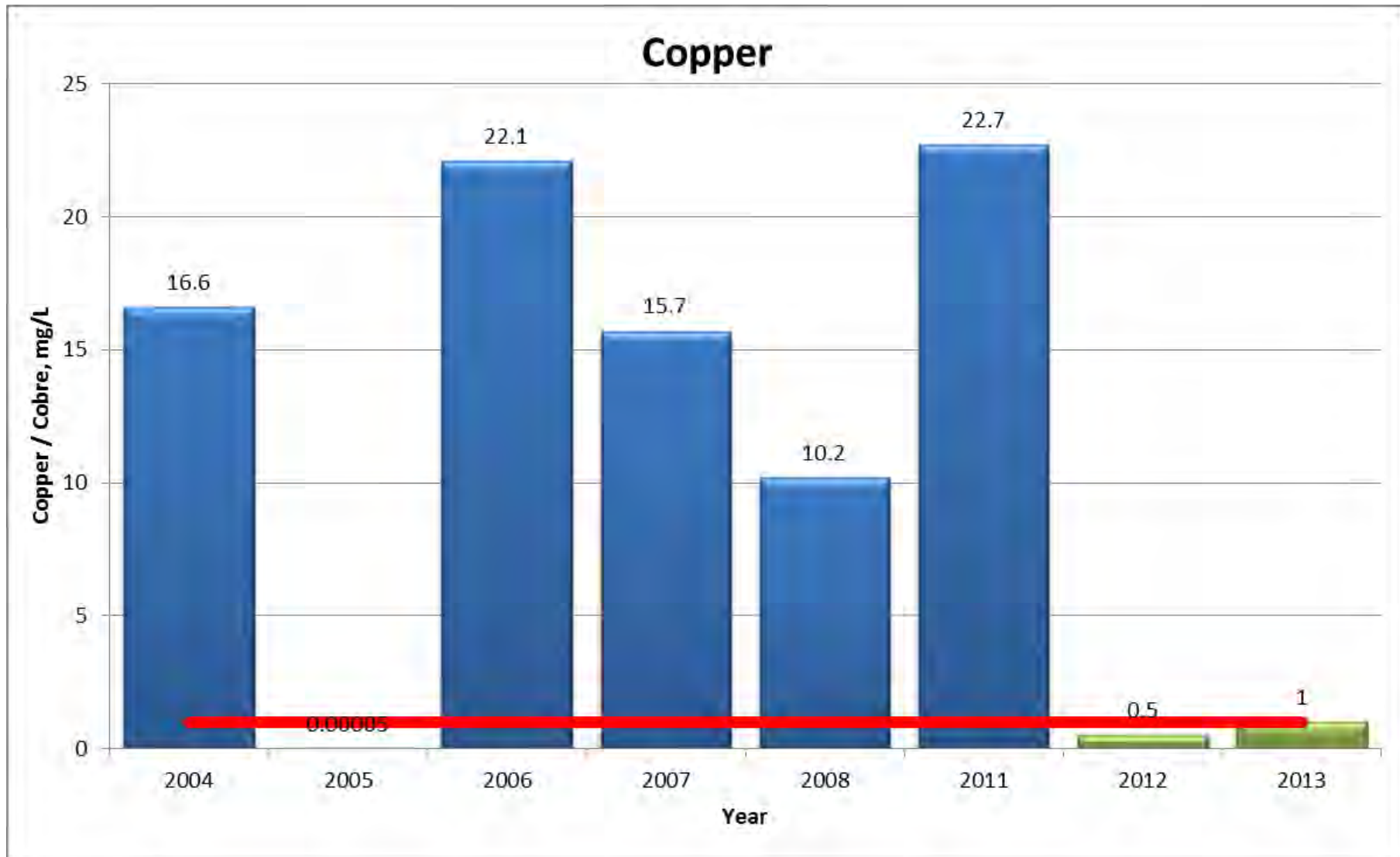
Also lower TSS and increases pH



# Water quality

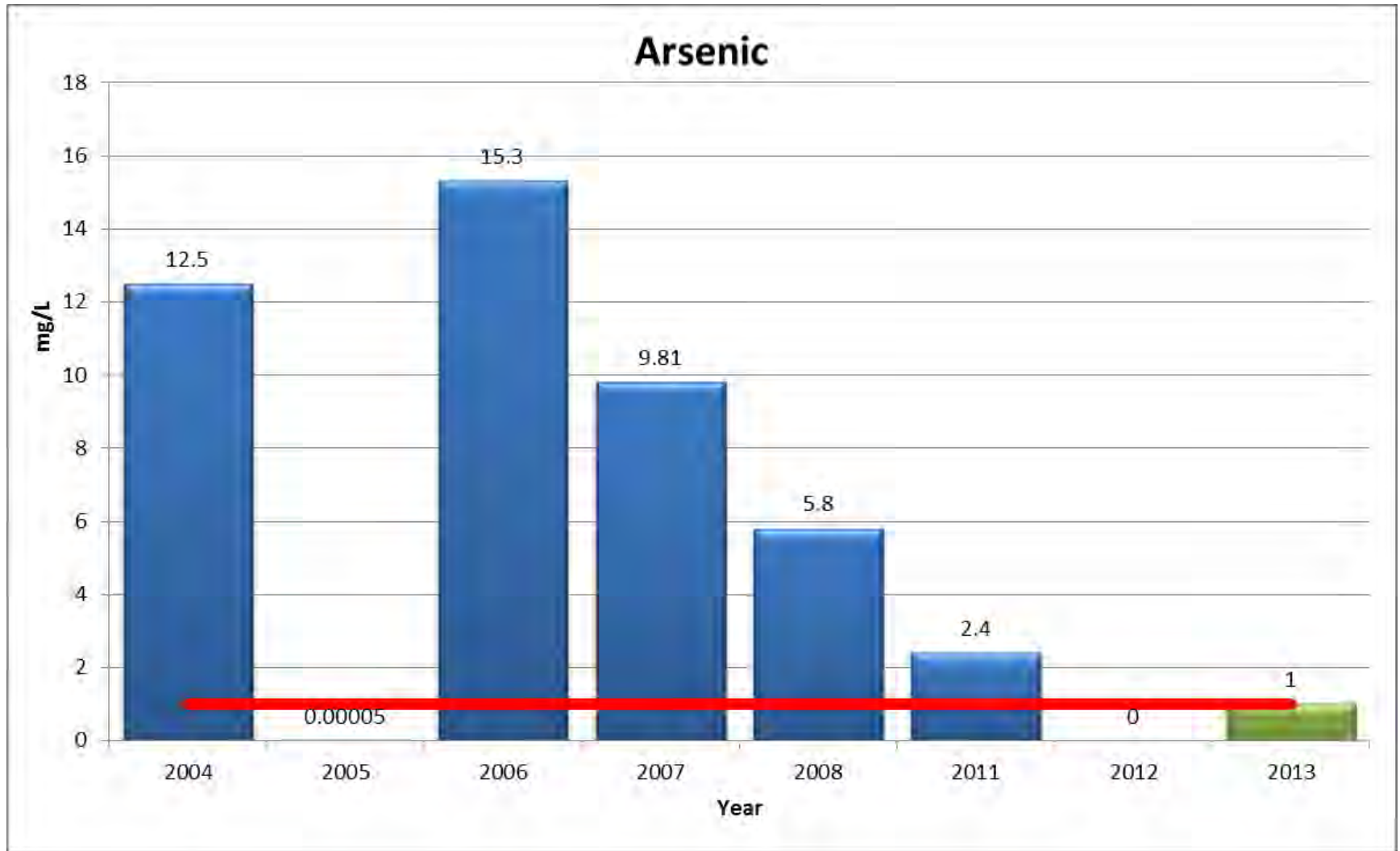


# Water quality

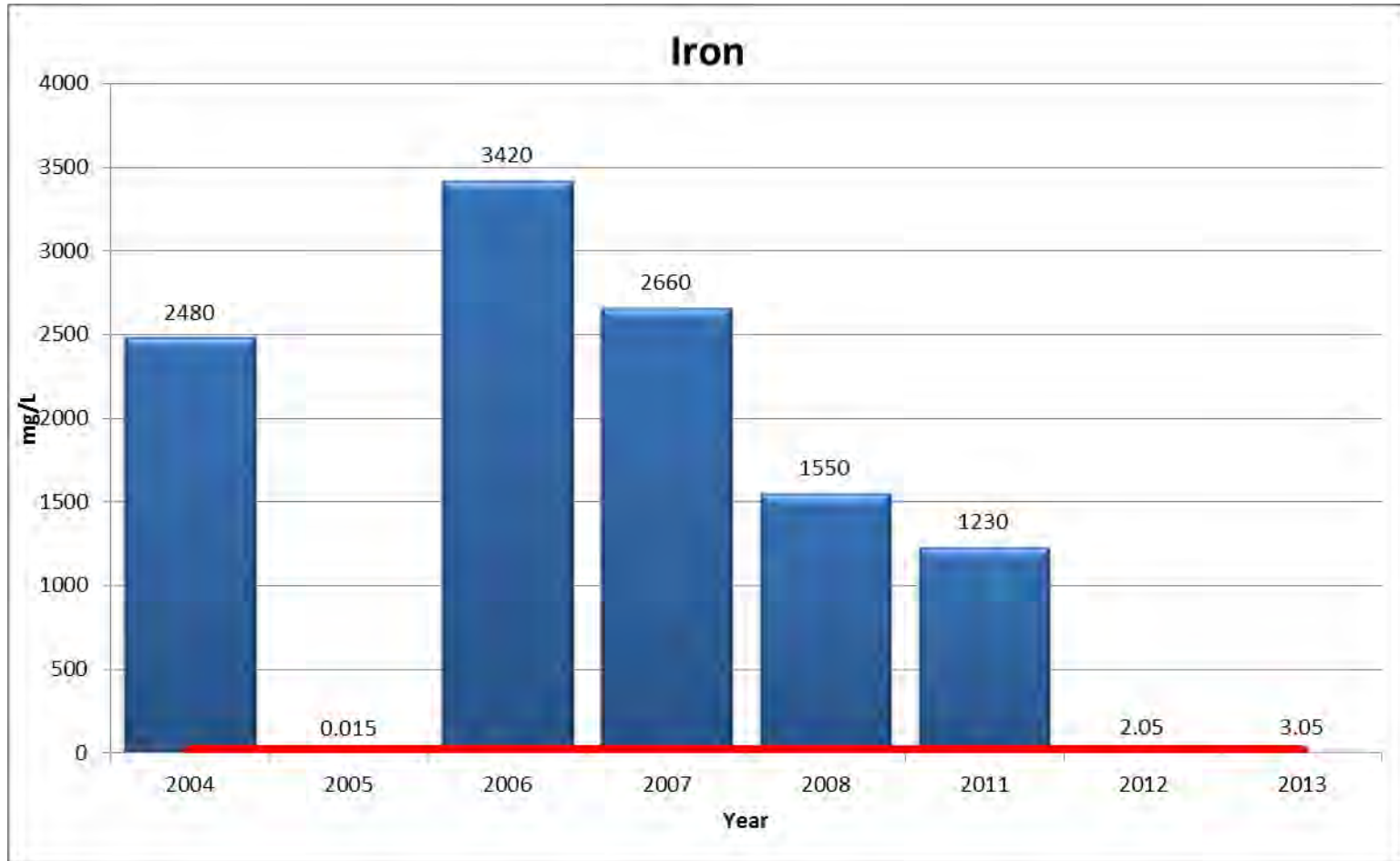




# Water quality

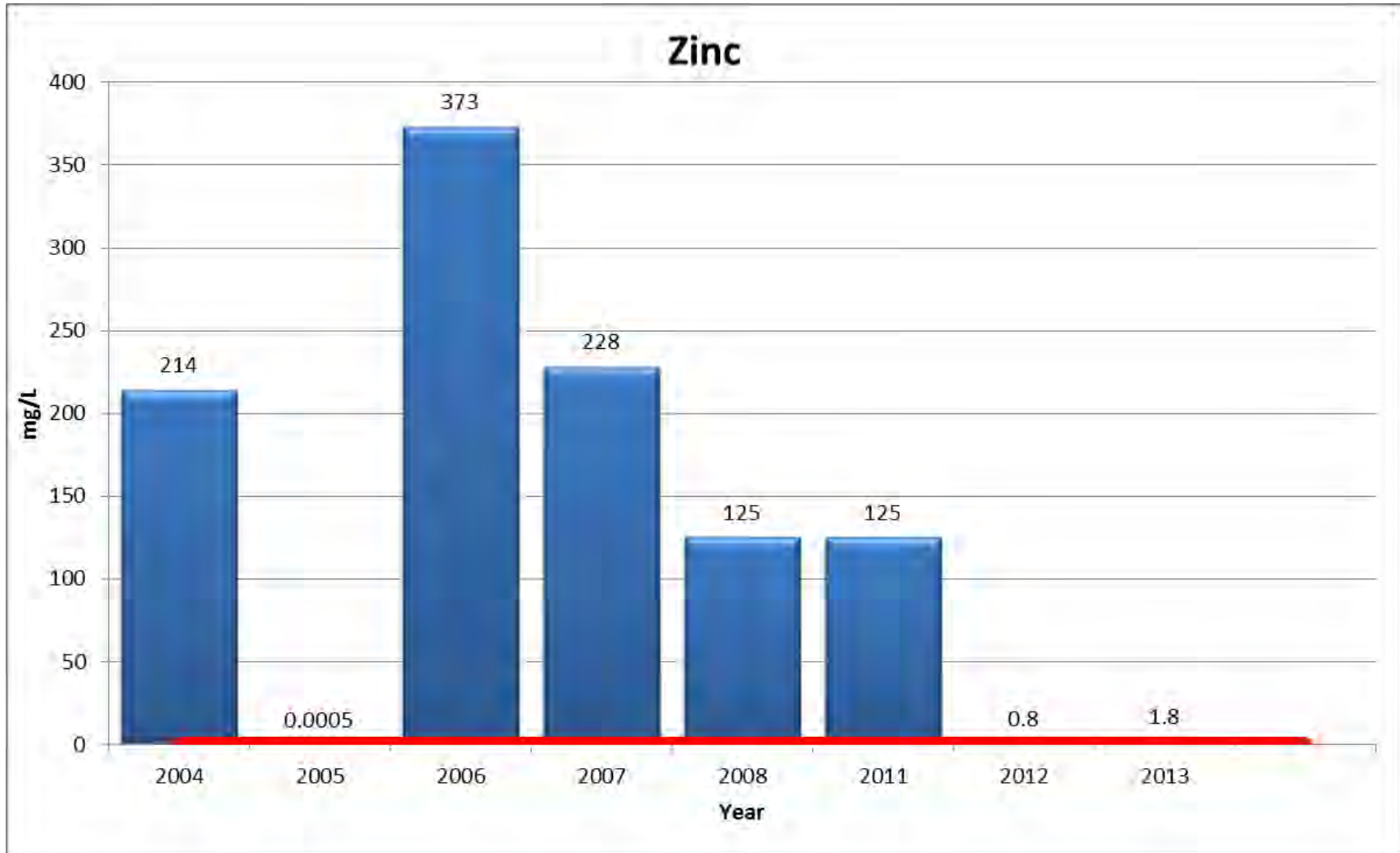


# Water quality





# Water quality



## 2014 ETP Discharge (January - July)

<b>Parameters (mg/l)</b>	<b>DR Standards</b>	<b>Average</b>	<b>Range (Min –Max)</b>
<b>pH</b>	6-9	8.47	7.6 - 9.19
<b>Copper (Cu) mg/L</b>	0.5	0.0202	<0.0003 - 0.1696
<b>Arsenic (As) mg/L</b>	0.1	0.0071	<0.0003 - 0.0433
<b>Iron (Fe) mg/L</b>	3.5	0.3539	< 0.001 - 0.541
<b>Zinc (Zn) mg/L</b>	2	0.1225	<0.003 – 0.586



# Margajita River 2006



ANTES / Marzo 2006 - Desembocadura del río Margajita

# Margajita Delta at Hatillo 2006





# Hondo Stream Positive Impact

**Before**



**After**





# Margajita River Positive Impact

**Before**



**After**





# Positive Impacts Margajita



- MARGAJITA RIVER BEFORE



- MARGAJITA RIVER NOW



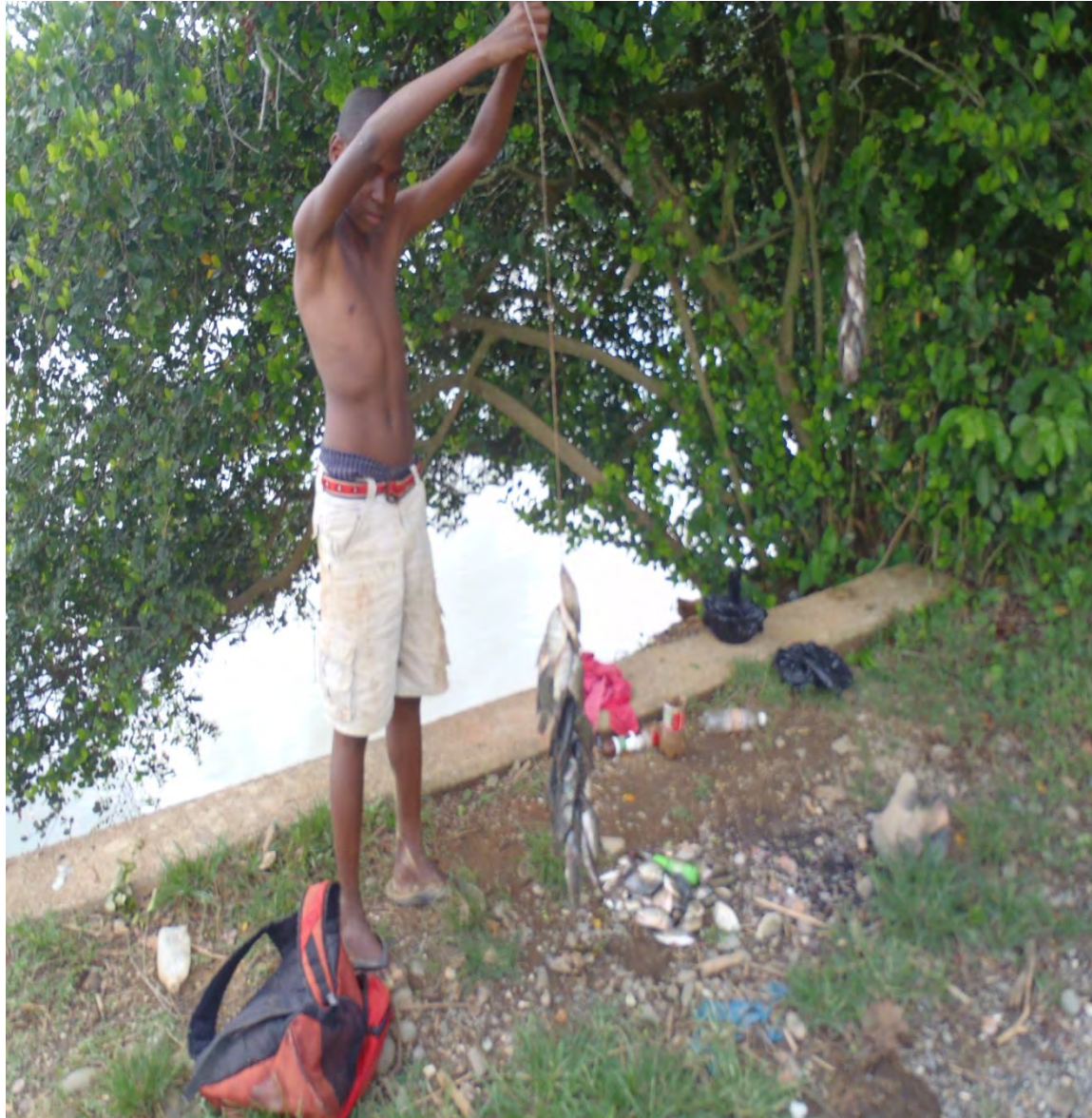


# Life back at Margajita River





# Life back at Margajita River





# Life back at Margajita River





# Positive Impacts Hatillo Reservoir

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Bringing Nile Tilapia  
to the Hatillo Reservoir

# Positive Impacts Hatillo Reservoir

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- In 2007, Hatillo fishermen suffered a setback in their hopes on a fish farming project which they expected to attain social and economic growth for their families
- Due to large storms, high sediments and poor water quality, facilities were lost and project was abandoned



# Positive Impacts Hatillo Reservoir

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# Positive Impacts Hatillo Reservoir

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In 2013, Barrick PVDC supported the Hatillo community to re-initiate a fish farm project.

Recently, fishermen are seeing good results from first harvest. They expect to get about 8100 lbs/year of fish to market in nearby communities.

108 families now have a chance to improve their life and get their dreams realized

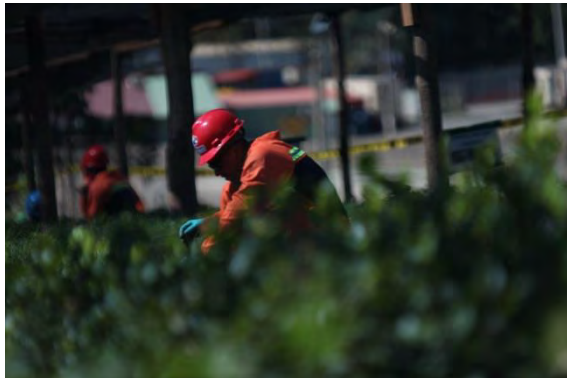


# Positive Impacts Hatillo Reservoir

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**Sustainable Mining focus in  
development of communities, people  
and the environment**