



Arsenic Pollution in Lake Olomega, El Salvador

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International Program

El Salvador



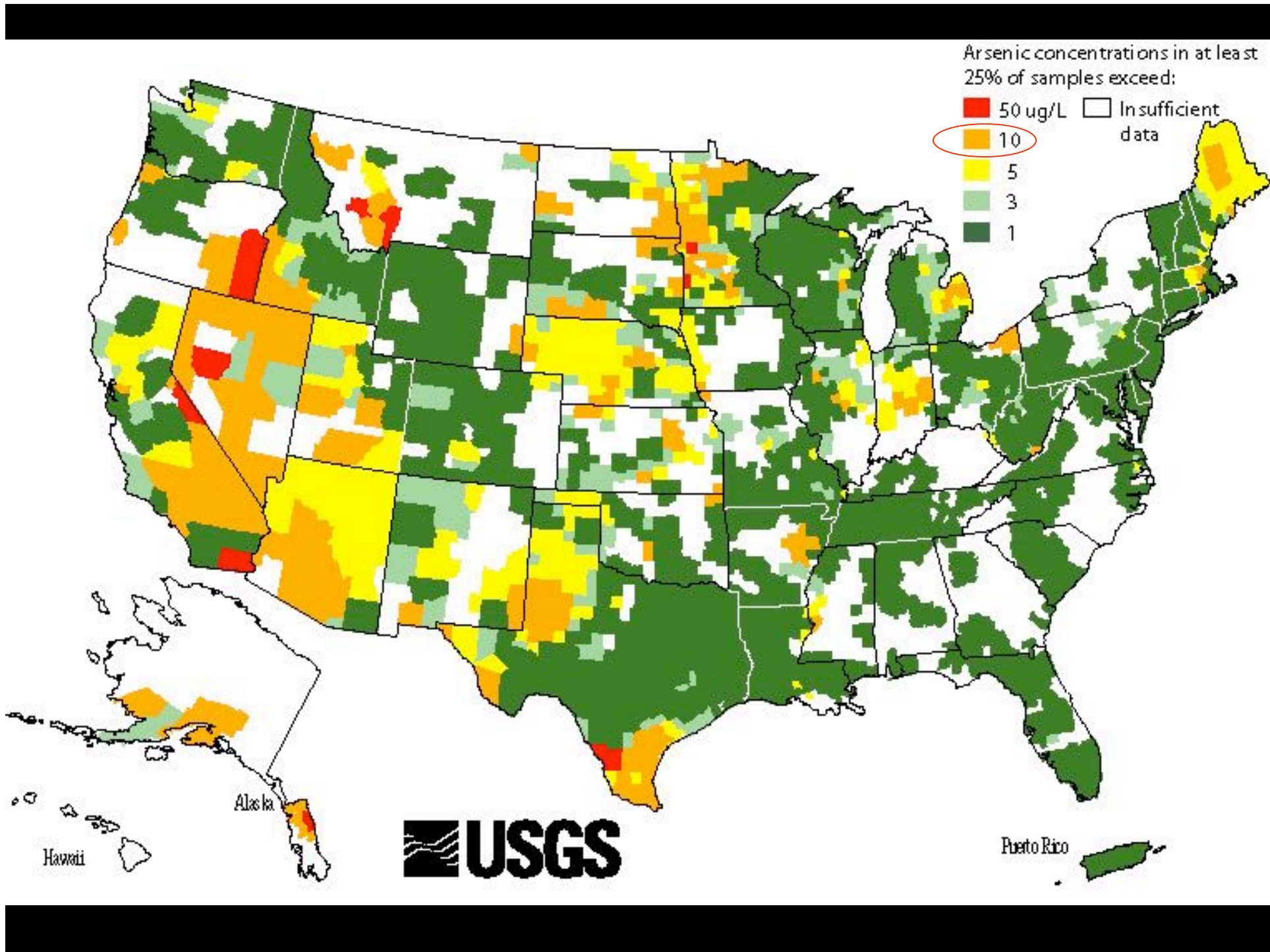
Lake
Olomega





Arsenic Problem

- Arsenic found in lake, and residents, but...
- Unknown source(s) for arsenic
- Unknown distribution (carriers)
- Unknown levels, seasonal variations
- Unknown impacts on humans, animals
- Unknown levels of understanding, concern



Health Effects of Arsenic

Dangers of lead and arsenic poisoning

Arsenic poisoning

Nerve damage

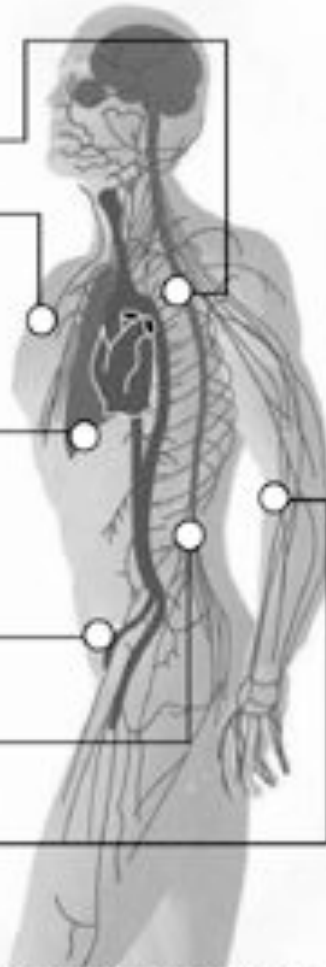
Skin damage:

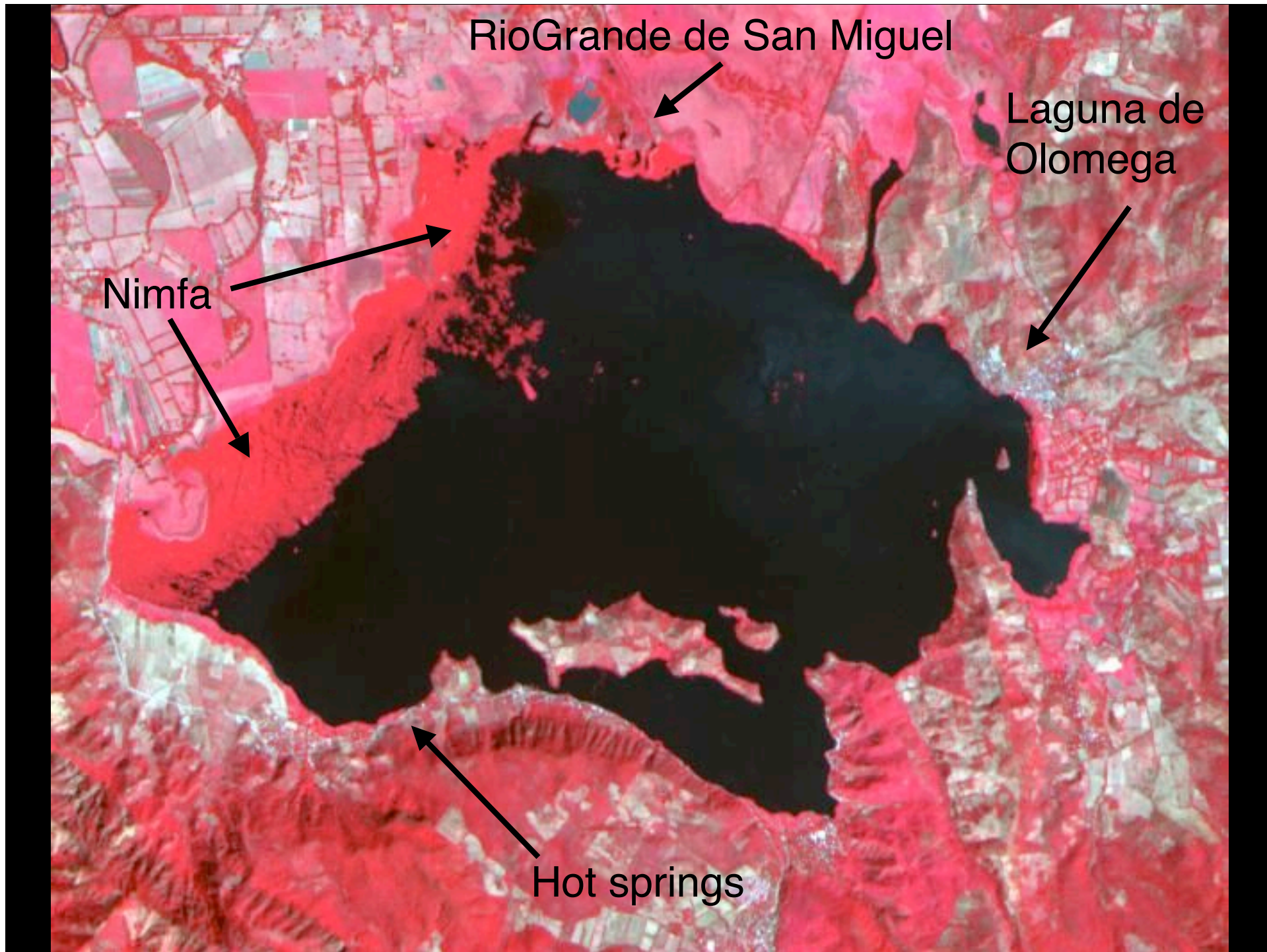
- Hyperkeratosis (scaling skin)
- Pigment changes

Increased cancer risk:

- Lung
- Bladder
- Kidney and liver cancers

Circulatory problems in skin





RioGrande de San Miguel

Laguna de Olomega

Nimfa

Hot springs

Nimfa problem

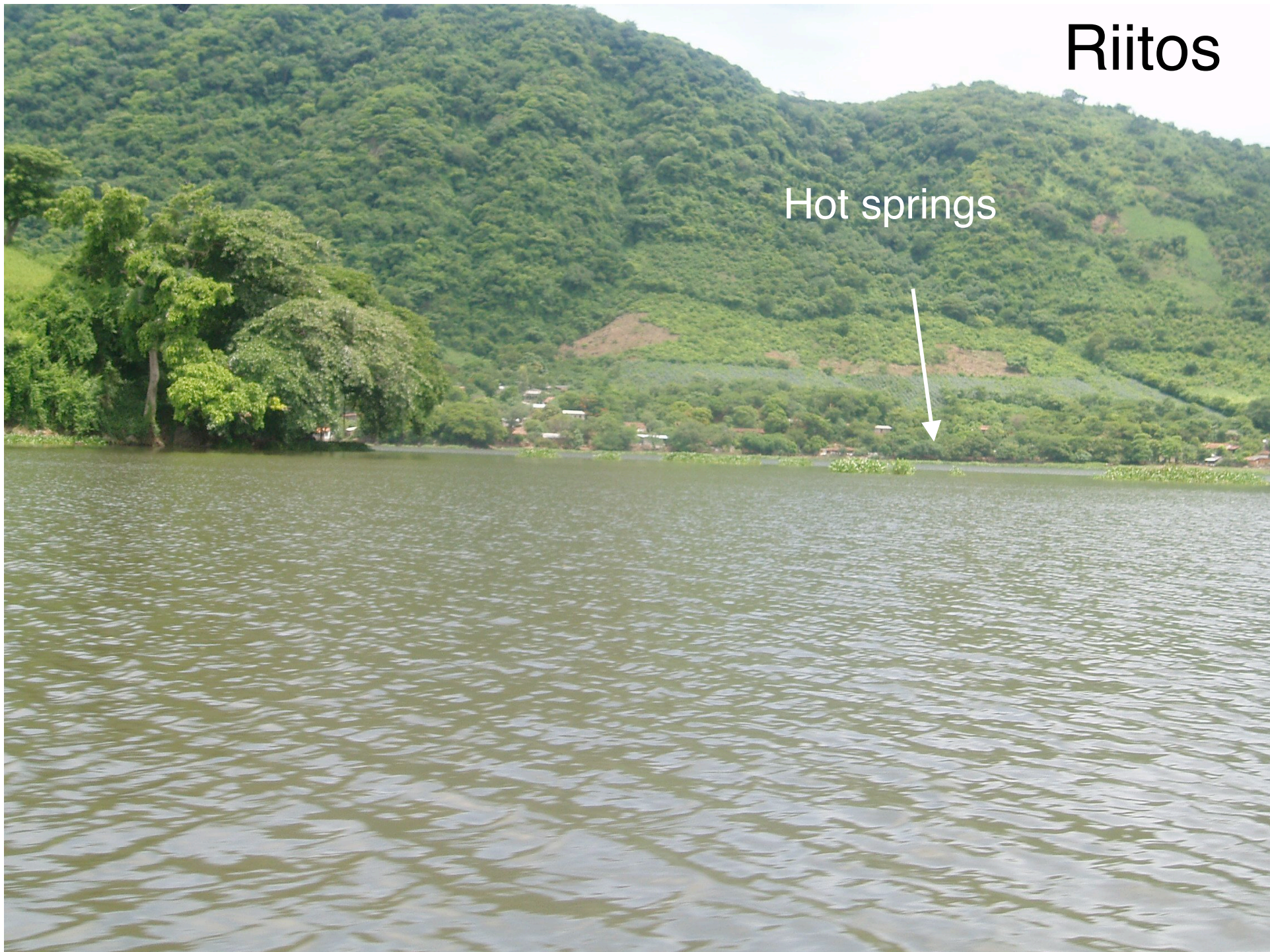
- Threat to navigation, fishing, tourism
- Possible carrier of arsenic
- Threat of eutrophication, sedimentation
- Attracts grazing animals into lake

Research Plan

- 1. Water sampling: lake, wells, hot springs, river
- 2. Human sampling (hair): Laguna de Olomega, Riitos
- 3. Animal sampling (milk and blood): cattle, pigs
- 4. Vegetation sampling: nimfa

Riitos

Hot springs



Water Sampling

Lake traverses
Hot springs on SW side of lake
Well waters in Olomega



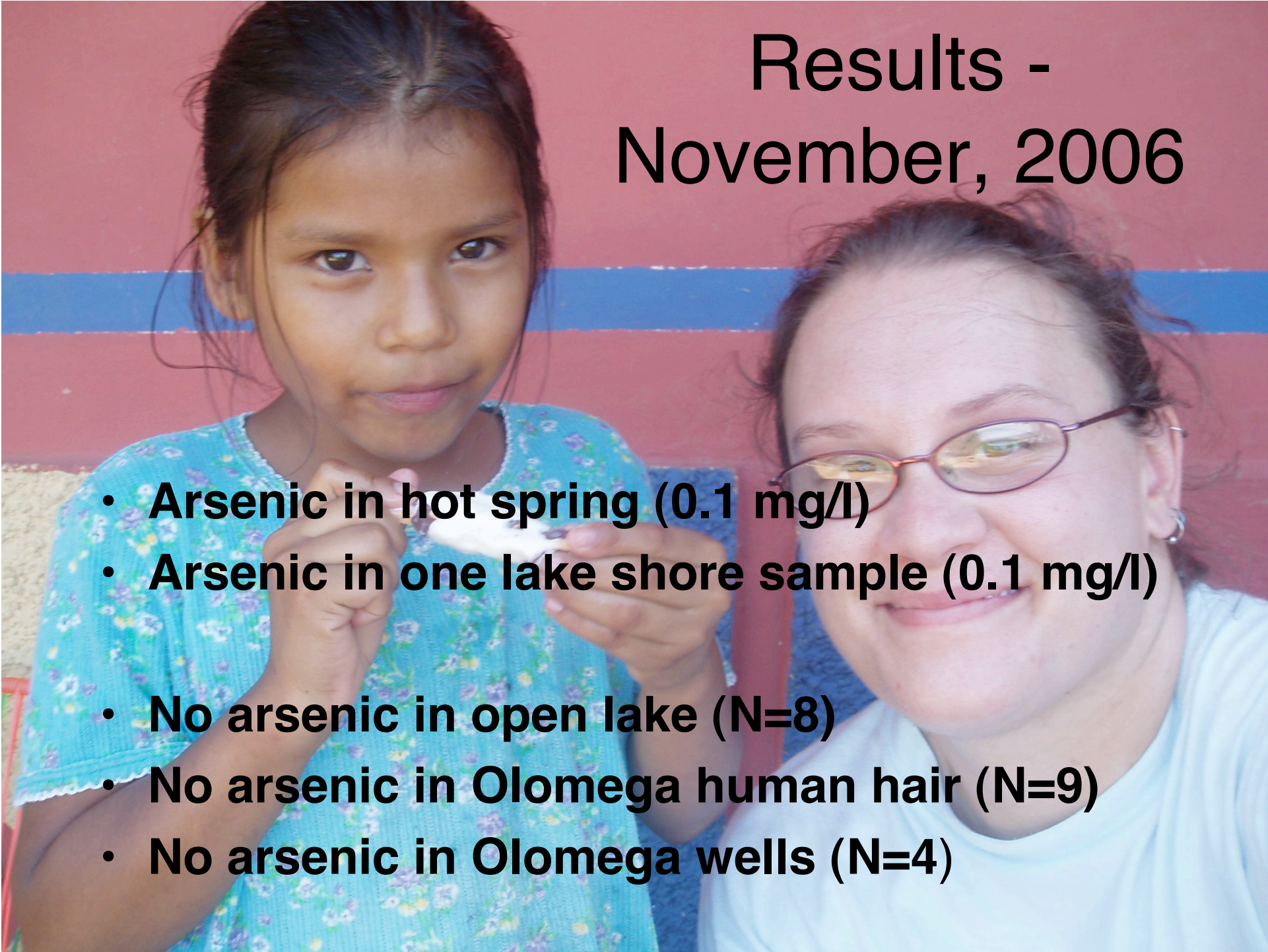
open lake

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Chloride	9	11/14/2006	4		SM 4500-Cl E	7647-14-5
Fluoride	0.1	11/14/2006	0.1	4.0	SM 4500 FC	16984-48-8
Hardness as CaCO ₃	41	11/14/2006	10		SM 2340 C	HARD-00-C
Iron	0.1	11/14/2006	0.1		SM 3500 FeB	7439-89-6
Nitrate as N	Not Detected	11/14/2006	0.4	10	SM 4500 NO ₃ F	14797-55-8
Nitrite as N	Not detected	11/14/2006	0.05	1	SM 4500 NO ₃ F	14797-65-0
Sodium	19	11/14/2006	5		SM 3500 NaB	7440-23-5
Sulfate	6	11/14/2006	5		SM 4500 SO ₄ E	14808-79-8

hot spring

TESTING INFORMATION			REGULATORY INFORMATION			
Analyte Name	Result (mg/L)	Date Tested	RL (mg/L)	MCL/AL (mg/L)	Method	CAS #
Chloride	99	11/14/2006	4		SM 4500-Cl E	7647-14-5
Fluoride	2.4	11/14/2006	0.1	4.0	SM 4500 FC	16984-48-8
Hardness as CaCO ₃	72	11/14/2006	10		SM 2340 C	HARD-00-C
Iron	Not detected	11/14/2006	0.1		SM 3500 FeB	7439-89-6
Nitrate as N	1.8	11/14/2006	0.4	10	SM 4500 NO ₃ F	14797-55-8
Nitrite as N	Not detected	11/14/2006	0.05	1	SM 4500 NO ₃ F	14797-65-0
Sodium	200	11/14/2006	5		SM 3500 NaB	7440-23-5
Sulfate	189	11/14/2006	5		SM 4500 SO ₄ E	14808-79-8

The analyses performed by the MDCH Drinking Water Laboratory were conducted using methods approved by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, 40 CFR parts 141-143, and other regulatory agencies as appropriate.



Results - November, 2006

- **Arsenic in hot spring (0.1 mg/l)**
- **Arsenic in one lake shore sample (0.1 mg/l)**
- **No arsenic in open lake (N=8)**
- **No arsenic in Olomega human hair (N=9)**
- **No arsenic in Olomega wells (N=4)**







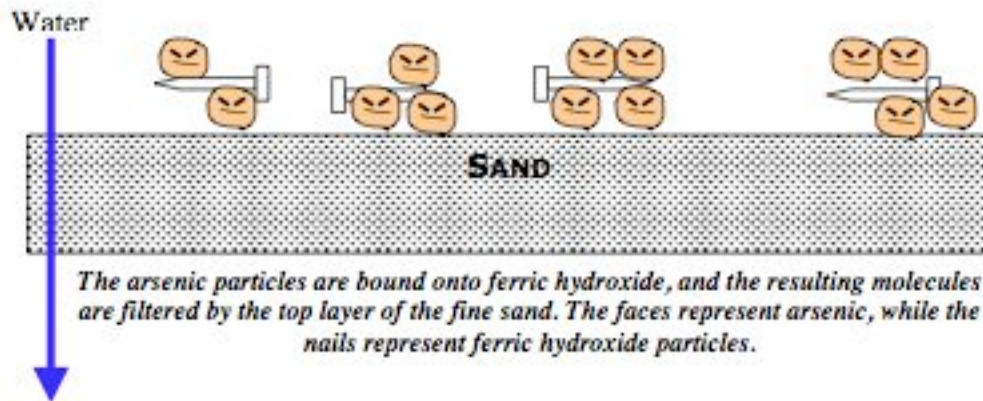


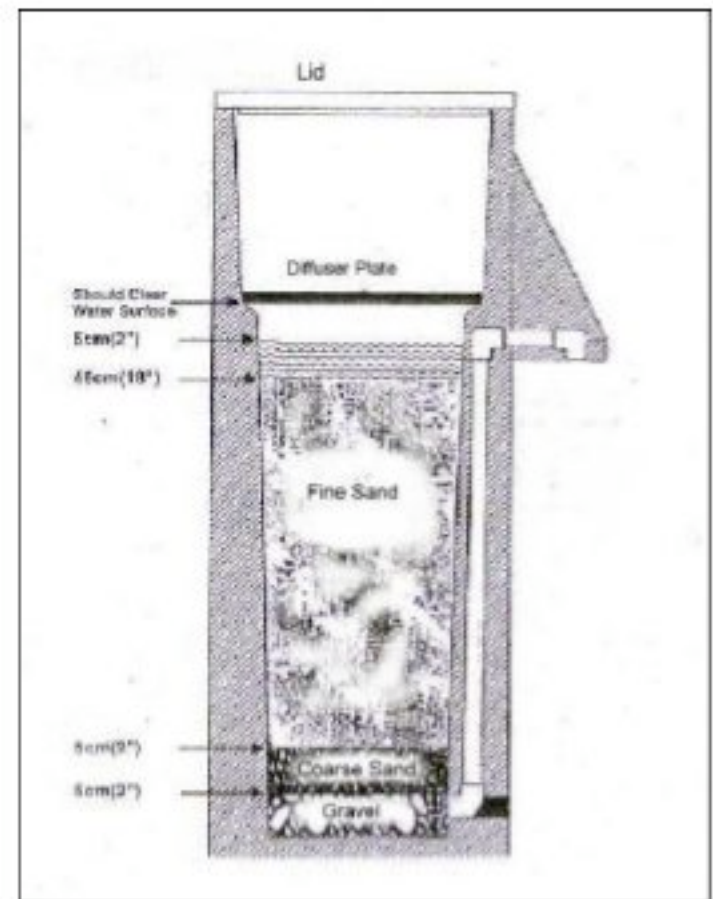
Figure 4 - A Simplified Illustration of the Arsenic Removal Mechanisms



Figure 1 - Concrete Arsenic Biosand Filter

Kanchan Arsenic Filter Project

Figure 44 - Cross-Section of a Concrete BioSand Filter



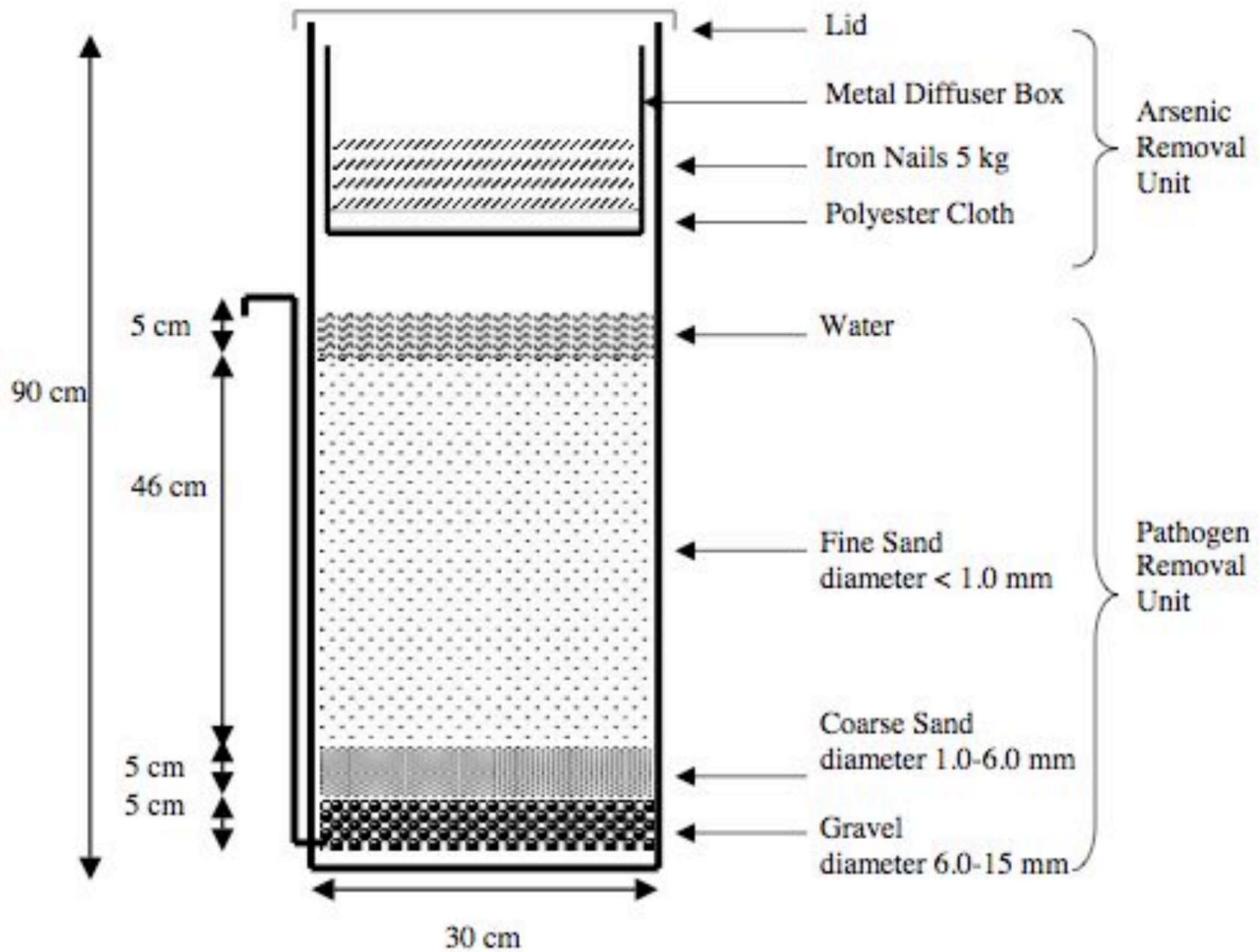


Figure 3 - Cross-Section of the Arsenic Biosand Filter Design (Jan 2003)