

## Overview of status and treatment solutions of Arsenic contaminated groundwater in Vietnam

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### Abstract

Elemental arsenic and arsenic compounds are classified as "toxic and dangerous" for the environment and humans. According to a survey by UNICEF, in Vietnam, the number of persons at risk due to exposure to arsenic up to 10 million people across the country. In many rural areas in Vietnam, people still often use groundwater is handled simply for the purpose of living. In such cases, the concentration of arsenic in water has exceeded the permitted standards, and in the long run will affect human health.

Arsenic contaminated water treatment technologies in Vietnam are still limited by the simple materials and low removal efficiency. Some research projects to produce Arsenic removal materials but there are only in laboratory scale, there are not to be commercialized and produced on a large scale. Besides, there are some materials and equipment imported, however the cost of management, operation, replace filters etc. are expensive and it is incompatible with life in rural areas.

Therefore, the research, production and selection of materials not only ensure better of Arsenic removal efficiency but also are cheaper, easier to use and replaced and suitable for economic conditions, society in rural areas of Vietnam are very essential issues.

Keywords: Arsenic, Groundwater, Risk management, Rural areas

### INTRODUCTION

Arsenic is known as a very toxic substance in water and according to WHO recommendations, water is considered contaminated water arsenic is arsenic from 0,01mg/liter or more. Arsenic contaminated water using excessive in a long time, the body is exposed to chronic arsenic and it can lead to cancer of the stomach, oral and skin.

According to incomplete statistics, there are about 21.5% of Vietnam's population (17.2 million equivalent) are using drinking water from water wells, and there are some studies show that groundwater in many parts of the Red River Delta have arsenic levels exceeding the permissible standards of the WHO as well as standards of Vietnam.

Similar in other Asian countries, Vietnam is marked on the map of arsenic contamination in the world and almost Arsenic contamination areas are located in the Red River Delta and Mekong Delta (Fig.1).

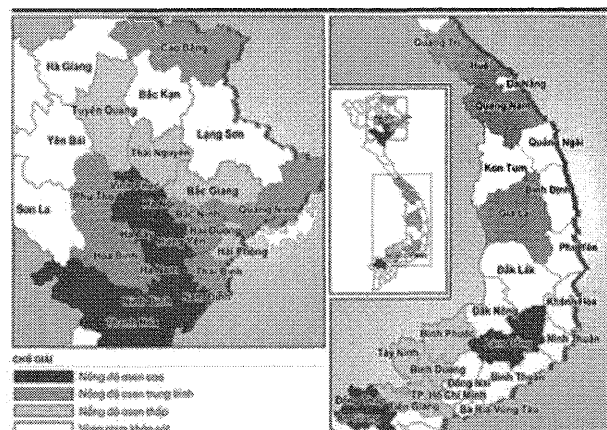


Fig.1 Map of Arsenic contamination water in Vietnam

(Source: Unicef in Vietnam)

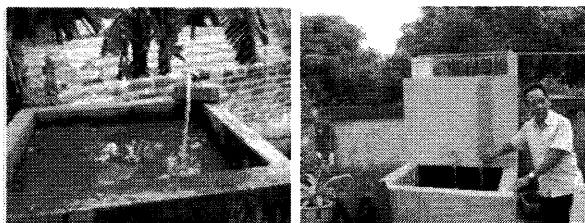
The arsenic concentrations ranged from 0.10 to 0.25 mg/l and arsenic concentrations in groundwater at the Red River

Delta higher than Mekong River Delta.

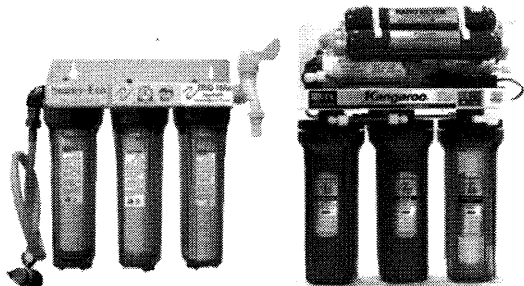
### Currently of Arsenic removal Technology

There are many technologies used to treat arsenic-contaminated water sources include: use of sand filter tank, activated carbon filter etc. are domestic materials; material and equipment imported and some research product.

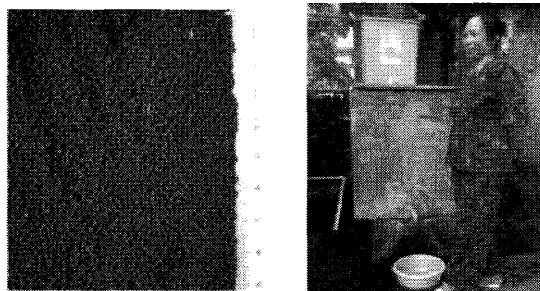
- ✓ Household sand filtration in the Red River delta



- ✓ Materials and equipment are imported



- ✓ Some research product



Existing issues and discussion:

- Household sand filtration
  - The traditional technologies: sand filtration, activated carbon not thoroughly treated Arsenic in groundwater. So the concentration of arsenic in water after filtration is still higher than standards allow for drinking water.
  - The awareness of the people is limited, the operation, maintenance replacement filter material is incorrect, effective treatment of groundwater Arsenic low.
- Materials and equipment are imported
  - Cost of management, operation, replace expensive filters are expensive and it is incompatible with life in rural areas.
  - Complex operation, requiring frequent replacement and maintenance.
- Research product:
  - These products are only in the laboratory scale. It is not to be commercialized and produced on a large scale.
  - The production cost is high and lack of investment funding

Conclusion:

Anywhere in the territory of Vietnam are at risk of arsenic contamination and almost Arsenic contamination areas are located in the Red River Delta and Mekong Delta.

Vietnam will be a big market for development and consumption process Arsenic treatment technology.

The develop and produce the treatment equipment of Arsenic contamination following criteria: (i) Arsenic remove capacity; (ii) Prices; (iii) Conditions; (iv) Operation and maintenance are essential factors to ensure safety for people's health and the sustainability of products.