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The groundwater pollution and environmental protection in China

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ABSTRACT

The economic achievements of China in the last 30 years had been commonly recognized as human innovation. However, the pollution on soil, air and water was accompanied with it. The groundwater pollution imposed great threats to people's life. After investigation on the water pollution, we found that it is very urgent for people to attach importance to environmental protection,and reduce the pollutants into groundwater.

KEYWORDS

Groundwater; Environmental pollution; Technology innovation.

INTRODUCTION

With the development of social economy, China's economic society has entered into the middle and later stage of industrialization as well as the stage of heavy and chemical industrialization, during which economic increase has resulted in lots of environmental pollutionaccidents. Therefore, people have made more discussions upon the issues of environmental protection, resources, population as well as sustainable development.

River pollution accident, which took place in Wenzhou in 2013, can quite well reflect the pollution accidents happening in our daily lives.

(1)200,000 Yuan offered to Anyone who is able to Persuade Chief of Environmental Protection Bureau to Swim in the River

Due to the serious pollution, one river located at Feiyun Street,Ruian, Wenzhou city, Zhejiang Province displays blue color and becomes a "Blue Danube". On 19th,the reporter contacted the chief of Environmental Protection Bureau, who explained that the river water turned blue due to the leakage of latex and the polluted water would be pumped into fire-fightingtruck and sent to sewage treatment plant for biochemical treatment.(one river at Ruian, Wenzhou becomes a "Blue Danube",http://www.chinanews.com/sh/2013/02-19/4577760.shtml).Jin Zengmin, the president of Maoyuanchang Glasses Co.,Ltd.in Hangzhou, Zhejiang province, made an astonishing declaration in his micro blog that,regarding to the serious industrial pollution of the river at Xianjiang street,Ruian, Wenzhou city, Zhejiang province, if chief of environmental protection bureau dares to swim in this river for 20 minutes, he will offer a reward of 200,000 Yuan.

(2)Aniline Leakage Accident of Tianji Coal Chemical Industry Group

On January 7th, 2013,the aniline leakage accident occurred in Tianji Coal Chemical Industry Group. Due to this accident,38.7t and 8.7t of aniline ran into the river. Different from the concealment of the death toll after some accident, concealment of the environmental pollution accident could possibly cause substantial damages to relevant people, which could further aggravate the accident; concealment of the death toll is only for relieving the guilt and responsibility, however, concealment of the pollution accident imposes great danger to other people for the sake of liability exemption, which is an outrageous act. Therefore, as for the leakage of dangerous chemicals, as long as the involved party and director of competent department still have some conscience, they should in no timesend out the warning messages to the people who are likely to be affected by the pollutants rather than consider their liability exemption; the loopholes of some rules and regulations should never become the excuses for the delayed reporting or concealment of such accidents.

In terms of environmental pollution accident,consequence of "concealing the accident in advance" will probably make the situation worse, which is not too complicated to understand. However, such kind of accident still frequently occurs(such as Zijin mining pollution accident,Qujing heavy metal pollution accident); therefore, by reverse deduction , it means that successful concealment of an accident is absolutely possible at least from the perspective of those who hide the truth.

(3)Love Canal Incident

Located in California, USA, Love canal is a canal dug for the establishment of hydro-power plant one century ago; however, it got dried up and abandoned in 1940s.In 1942, an electrochemical company in America bought this abandoned river of about 1000 meters long and used it as waste warehouse for dumping large quantity of industrial wastes, which lasted for 11 years. In 1953,after being landfilled and covered up by the company, this canal full of various toxic wastes was delivered to local educational institution as a gift. Later on,municipal government of New York developed the real estate, built a large number of houses and a school in succession. Since 1977,local residents constantly suffered from different kinds of weird diseases; and the disease such as miscarriages, premature death of children, physical deformities in babies,epilepsy andhemoproctia also frequently took place. In 1987,the ground started to exude black liquids with multiple toxic substances.

The residents in Love canal community realized that they had to unit together and exerted pressures to the government, so that it could take actions. Filled with indignation, the residents detained the representative of U.S. environmental protection agency as hostage and requested the White House to make a promise for helping them solve the problem and evacuate the residents as well as to announce that this is a severely afflicted area.This incident instantly aroused rumbling disputes; surprisingly in accord with each other, the media accused the government by publishing the articles one after another and declared that they supported the residents' actions; also, they called upon the government to make explanations for this scandal as soon as possible and deal with it properly.

Few days later, the residents finally got the response. President Carter issued the prerogative writ, which allowed federal government and state government of New York to carry out temporary relocation for nearly 700 residents in Love canal community of Niagara Falls area. 7 months later, Carter issued epoch-making decrees and established "super petty cash", which means that federal funds were used for cleaning chemical substances and toxic waste yard for the first time throughout the history. Love canal incident awakens people's awareness of chemical wastes; in the meanwhile, it also exposes a government scandal for the media to make sensational reports

This is the landmark event in abroad which shows that groundwater pollutioncan lead to serious consequence---Love canal incident.

(4)Pollution Discharge through Soakaway Pit and Seepage Pit

Pollution discharges through soakaway pit and seepage pit have been listed as the prohibited activities of the country.However, under the drive of economic profits, some companies still discharge their pollutants into the ground:some companies in North China have been discharging the pollutants into the ground through soakaway pit and seepage pit, which severely pollutes groundwater resources. This is like injecting toxin to your own body.

It is one of the important factors resulting in the existence of cancer village in China

POLLUTION CONDITION OF GROUNDWATER RESOURCES IN CHINA

However, in China, pollution condition of groundwater resources is not optimistic and it is getting increasingly perilous. "According to preliminary findings from China Geological Survey, 90% of urban groundwater in China is subjected to the pollution from organic and inorganic toxic pollutants to different degrees". ZhengChunmiao, head of Center For Research in Water Resources in Peking University and expert from "Thousand Talents Program" of China, discloses that, "about 30 million people in more than 10 provinces to the north of Huai river are drinking water with high nitrate; about 360 million people in rural area cannot get the drinking water which meet the standards.

These astonishing data indicate the groundwater crisis which is always in the "latent" state. It is urgent to pay attention to, attach importance to and reinforce the treatment of groundwater pollution

"3-nitrogens" are the most common groundwater pollutants, and especially in rural area and agricultural cultivation region, nitrite, nitrate as well as ammonia nitrogen all exceed the normal level; then heavy metal pollutants should be also considered. Pearl River Delta is mainly confronted with excessive lead,Huai River basin is mainly confronted with excessive cadmium, North China Plain is mainly confronted with excessive arsenic, Yangtze River delta is mainly confronted with excessive chromium, which is mainly distributed at cities as well as industrial and mining cities;at the local areas such as oil production plant, gas station,and chemical industrial area, organic pollutants in the groundwater are constantly increasing.

65% of domestic water in the northern area, 50% of industrial water and 33% of agricultural irrigation water come from groundwater; among 655 cities throughout the country, more than 400 cities take the groundwater as the source of drinking water.

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"About 30 million people in more than 10 provinces to the north of Huairiver are drinking water with high nitrate; about 360 million people in rural areas cannot get the drinking water which meet the standards.(The above information is originated from Thousand Talents, the internal reference materials for the high-level experts of national thousand talents plan)

POLLUTION SOURCES OF GROUNDWATER

Agrochemical,excessive pesticide and ammonia nitrogen

Industrial solid waste

Domestic sewage and household garbage

The ratio of disposal and utilization of industrial solid waste in China is quite low. In 2008, about 200 million tons of garbage could not be handled with timely disposal and comprehensive utilization; as a result, the garbage would all leak into the ground, for example, due to the leakage in the dumping yard ofchromic slag and manganese slag,groundwater pollution accident occurred from time to time.

Silent earth does not only provide all the things that human need, but it also takes all the wastes human have produced, however, everything should be dealt in moderation. In fact, any kind of pollution that human have caused to the soil could be reflected by the quality of groundwater,and toxic groundwater is the result of excessive soil pollution. "Just like the water-absorbing sponge, it will be squeezed out under the pressure", Shi Xiaojuan, head of Drinking Water Division of Pollution Prevention and Control Department in Ministry of Environmental Protection in China, has described their relationship like this.

In recent years, in order to gain rapid development of the economy,multiple and heavy pressures have been imposed upon the soil; once agricultural pollution,forestry pollution, domestic pollution as well as industrial and mineral pollution etc have accumulated to a certain degree, the pollutants would leakdownward and pollute the groundwater. Just like senior expert of China Hydraulic Engineering Society Li Guibaosaid,"the factors leading to surface water pollution and soil pollution are the causes for groundwater pollution".

Even so, there are major and minor pollution sources. The first cause for the severity of current groundwater pollution is dramatic enlargement of the city. "According to the bulletin of environmental statistics in China,processing ratio of urban domestic sewagethroughout the country is only 57.4%, which means that large amounts of unprocessed urban domestic sewage will pollute the groundwater by various means such as infiltration through septic tank and sewage draining canal.

Except for domestic sewage, domestic waste is also a major pollution source," rate of hazard-free treatment of urban domestic waste throughout the country is only 62%;besides, among 935 operational landfills, more than 300 ones do not take the anti-seepage measures. This will cause a great deal of landfill leachate to leak into the ground and thus affect the quality of groundwater.

The second major source for the groundwater pollution comes from the industry. The ratio of disposal and utilization of industrial solid waste in China is quite low. In 2008, about 200 million tons of garbage could not be handled with timely disposal and comprehensive utilization; as a result, the garbage would all leak into the ground, for example, due to the leakage in the dumping yard ofchromic slag and manganese slag, groundwater pollution accident occurred from time to time.

The exploration,exploitation, and production undertaken by some industries such as petrochemical industry can also have remarkable influences over the quality of groundwater. Besides, due to various reasons, some industrial companies randomly dump the unprocessed industrial waste water, which could also lead to the groundwater pollution. Non-point source pollution is also a significant cause of groundwater pollution. Fertilizer input per unit area of farmland in China is 2.8 times of the average input in the world; however, water consumption per unit area is 3 times of the average water consumption in the world. As a result, large amounts of fertilizers and pesticides pollute the groundwater by various means such as surface

runoffinfiltrationand soil infiltration,"ZhengChunmiao states frankly, non-point source pollution is the "culprit" which causes 3-nitrogen pollution of the groundwater as well as organic pollution.

That is why 3-nitrogens contained in the groundwater near most rural areas and agricultural cultivation regions exceed the limits.

Furthermore, in recent years, long-term excessive exploitation of the groundwater resources in China has led to the constant drop of groundwater level in some areas. What is worse, quite serious problem of land subsidence can be found in many regions, which in turn aggravates the groundwater pollution. Due to severe excessive exploitation of groundwater, large funnel-like regions have been formed in some places in north China plain; under the pressure,the surface water in surrounding areas enters into these regions, which will make the groundwater more vulnerable to the pollution.

Excessive exploitation of groundwater in coastal areas will also bring a serious problem, that is, infiltration of salt water and sea water will contaminate the groundwater. "Excessive exploitation of groundwater in some coastal areas in China has disturbed the balance between fresh water in aquifer of coastal zone and salt water in the sea, which cause the fresh water body in the groundwater of some regions to be invaded by sea water and thus lose its function as drinking water.

DIFFICULTIES AND CONSEQUENCES OF TREATMENT

Groundwater pollution is characterized by being elusive, time-delaying and irreversible

If surface water is contaminated, it can be simply distinguished by smell, color, and condition; however, it is very hard to distinguish whether the groundwater has been contaminated or not.

If the groundwater pollutants can hardly get cleaned, heavy metals will be hardly degraded.

The release of groundwater pollutant is a slow process; therefore, ordinary people can hardly be aware of or have the ability to verify the relevance between the groundwater and negative influences it is subjected to.

Due to various causes, economic development of China adopts the route of "pollution first, treatment later" .Moreover, the development policy of "everything should be GDP-oriented" makes the government habitually ignore the issue of environmental protection, which can also be seen in the prevention and treatment of groundwater pollution. Many local governments still can not fully realize how important and how urgent it is to conduct the prevention and treatment of groundwater pollution.

Conceptual indifference directly leads to absence of supervision or inadequate supervision. In most regions, facilities for prevention of groundwater pollution and groundwater protection are not fully equipped; moreover,supervision and control system as well as warning and emergency system for groundwater pollution have not been established yet.

The latency of crisis also comes from the unawareness at the public level. Currently, groundwater crisis has not yet caused serious conflict events, and thus general public can hardly realize that a huge crisis is approaching. Researcher of water resources Zhou Chen thinks that, major force of groundwater protection should be the public, and therefore the public are required toactively engage in the groundwater protection. This idea is highly recognized by several industry experts such as Li Guibao and Ma Jun.

In America, the bottom-up pollution prevention and treatment mechanism plays a decisive role in the prevention and treatment of groundwater pollution. Citizensare not only highly alert to the pollution, but they are also accustomed to protecting their rights by lawsuits. Therefore, once any enterprise conducts the pollution, they will be sued without hesitation. The balance mechanism has been formed between public, government and enterprise. In front of huge pressure from public opinion, the enterprises have to voluntarily control their pollutant discharges, and the government has to undertake their due regulatory responsibilities.

REFLECTIONS ON ENVIRONMENTAL PROTECTION

Kuznets Curve is a theory which is used by Nobel Prize winner and economist Kuznets to analyze the relationship between per capita income level and fairnessdegree of distribution in the 1950s. Researches show that,with economic growth,income inequality first rises and then falls, which demonstrates inverse U-shaped curvilinear relationship. For a country with quite low economicdevelopment level, its environment will be less polluted; however, with the increase of per capita income,environmental pollution will go from a low level to a high level, and environmental degradation will be intensified with economic growth; when economic development reaches a certain level, that is, when it reaches certain "critical point" or "turning point ", with the further increase of per capita income,environmental pollution will go from high level to low level, degree of environmental pollution will be gradually reduced, and environmental quality will be gradually improved. This phenomenon is called environmental "Kuznets Curve".

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