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China: The current situations and solutions of water pollution in small towns

Abstract: Developing countries especially fast developing towns focus their main attention to the development of industrialization and urbanization, so water pollution made by factories, companies, and citizens is hard to avoid. Domestic water and industrial sewage have made large amount of polluted water, which brings short-term and far-reaching harm to agricultural production and more seriously, to human body, which makes people die and be deformed born. Water pollution has seriously affected the quality of food by making visible and latent effect in crop planting, food processing and food cleaning. In this passage, we will study the change of water quality, the main causes of pollution and suggestions on how to solve this problem by researching about a family living in a small town in YiLuo River basin, Henan Province, China. About the solutions, the passage specially put forward a proposal to set up education system focusing on the extension of food security knowledge.

Keywords: Domestic water; industrial emission; water pollution; serious effects; management plan; education system

ShanHua Township is a small village lying at the foot of Mang Hill in YanShi city, Henan Province, in which my mother was born and brought up. The Yi River and Luo River joined here to form YiLuo River, an important part of Yellow River with water of good quality. Since ancient times, people have considered YiLuo River as the holy water given by god, and it does have nourished myriad of people and plants living in the basins. When I was young, I sometimes went back there, my mother's hometown, to play in the wide clear river with my friends, as what my mom did in her childhood. We played in the field while adults were planting crops in Spring, catching fishes and swimming in the river during summer, and in those cold days, wild plants grown along the river provided us with food and medicine to keep out the cold. In this large rainless area, YiLuo River provides almost all the water used in planting and in life. People set up 3-step irrigation stations along the river to convey water up to the hills to water the plants. With the easy obtained water, the high production of food increased the enthusiasm for production of farmers.

This year when I came back to the place after several years' not being back, I was shocked by the brown smelly water in the river. The river looks desolate with few people there, flowing quietly just like singing a sad song. The truth is that when it came to 21 century, the industrialization process was fastened. Towns built up paper mills, shoe factories, chemical plants and other large factories. Harmful discharges created by factories have seriously polluted the river. Several years before, the water pollution caused the pig collective death. The metamorphic water can't be used to fields watering, on the other hand, factories attracts farmers to leave their field and become workers, so the irrigation stations and fields on the river-side are mostly abandoned. Without enough farm production, even farmers need to buy their own food. Barren hills, foul river, the place seems to have been totally destroyed.

Not only in Henan province, but in the whole country and other developing area throughout the world, water pollution has become a serious threat to the safety and quality of food. For instance, the villagers poisoning event in Baisha, Guangdong Province is caused by unqualified industrial water discharge, which put 41 villagers to death and effected all the people in Guangzhou. Also, Songhua River basin, Huai River basin and many other high populated areas are seriously effected by water pollution, which makes people hard to get safe drinking water and agricultural products(www.aquasmart.cn). In this passage, we

take YiLuo River basin as an example and discuss about water pollution in detail.

Pollution sources and their effects

1. The overuse of water resources lowers the self-cleaning capacity of YiLuo River.

YiLuo River is the part of Yellow River with less sediment, with the large and medium-sized cities and a large tract of farmland. As the step of economic construction was fastened, the reservoir of YiLuo River conducted a large-scale renovation and reconstruction. Today, there are two large reservoir, ten medium-sized reservoirs, and more than two-hundred small reservoirs along YiLuo River basin, the total capacity of water can reach 2.65 billion cubic meters(Ma Zhiyou). The excessive use of water resources directly affects the sustainable development ability of river basin, and this is the direct reason of why YiLuo River's water quality can not be thoroughly improved. The excessive use of urban water and agricultural water destroyed the water ecological system, causing the decrease of self-purification of water, which reduces the capacity of pollution emission and self-purification, so the pollutant content is increasing and many kinds of aquatic organisms and the plant near the river are killed, the water quality of YiLuo River basin is getting worse.

2. Industrial pollution

YiLuo River basin is relatively developed areas along the Yellow River basin, and has abundant resources. Many heavy pollution industries such as mining, machinery manufacturing, chemical industry, electric power, metallurgy are the pillar industries in these towns; these led to the result that the quantity of wastewater effluent in 2014 reached 218 million and the average annual growth rate is from 2.22% to 2.05% . COD emissions were 16100 t and ammonia nitrogen emissions was 1781t(Zhang Shikun). Through investigations, people find that the pollution mainly comes from metal-processing industry, electric power industry and chemical industry. The wide intertwined distribution of township enterprises and agricultural ecosystem make the more serious threat to arable land caused by industrial waste water discharge, so comprehensive prevention and treatment should be carried out as soon as possible.

In the last few years, the government has paid attention on management to invigorate large enterprises while use slack policies over small ones, and carried out correct adjustment of the industrial structure, YiLuo River's sewage treatment facilities in industrial enterprises has been effectively improved, but part of the industrial enterprises often close sewage treatment facilities without authorization and illegally discharge sewage to reduce production costs and pursuit the profit maximization. Therefore, industrial pollution is still the important causes of pollution in YiLuo River.

3. Fast increasing domestic sewage

As the large population base and the urbanization of YiLuo River basin, YiLuo River basin's population is increasing rapidly and sustainedly. The proportion of domestic sewage becomes bigger and bigger, combined with the lack of rural sewage facilities and the poor environmental awareness of farmers', a lot of untreated sewage is directly discharged into rivers and this becomes the important factors affecting the water quality safety of YiLuo River basin.

4. Aggravating of rural non-point source pollution

The rural non-point source pollution has become a new pollution source of YiLuo River basin. There are broad cultivated land areas along YiLuo River basin and it is a major bread basket of China. In recent years, more and more varieties of pesticide and fertilizer have been used and the amount is becoming

larger and larger. For example, farmers often used manual weeding in the past, but now they all use herbicides weeding. The wide use of pesticides and fertilizers severely damages the ecological balance of farmland, and leads to the resistance enhancement of insect pests, thus forms a vicious circle. Seventy percent of pesticides and fertilizers used in agricultural production in the basin remain in the soil and agricultural products, a large number of pesticides, chemical fertilizers, untreated waste of agricultural production and rural living garbage and waste water are scoured into underground and surface waters through irrigation and rainfall runoffs, this directly affects the ecosystem of YiLuo River basin.(Li Guoxue)

5. Unreasonable development pattern—attaching great importance to the economic development and neglecting environmental protection

Nowadays the economic growth mode of YiLuo River basin is still traditional, mainly focusing on economic development but paying little attention to sustainable development, so structural pollution is still severe. Metallurgy industry, chemical industry and other energy intensive and highly polluting industries in Henan province still produce large amount of output value which accounts for more than 60 percent of industrial production, 80 percent in the energy consumption structure is taken up by coal, 10% higher than the national average (The People's Government of Henan Province). But for a long period of time, Henan Province mainly concentrates on end-of-pipe control instead of controlling at the source of the pollution---the highly polluting enterprises. Thus the economic growth structure of YiLuo River basin is one with high water consumption, high pollution but low level economic growth. And that is also why Henan has been sticking to pollution control but has got little in result.

Analysis and suggestions on preventing and controlling water pollution

It is a complex and integrated project to solve this problem, which needs mutual participation of government and the public, and which depends on the development of technology and the combination of different measures for different side of the problem. Trough studying, the experts have found that the main shortage of Henan province are the followings: the lack of the capability of independent innovation; enduring resources and energy consumption; slow development of tertiary industry; imbalanced and slow urbanization development (Henan Statistics). The following passage is trying to solve the problems above.

For the government:

1. Shift the development model. Cut the proportion of highly polluting enterprises by closing down, suspend operation, merging with others or shifting to different line of production. Optimize the industrial structure and improve the complementary businesses between upstream and downstream companies. Push forward the formation and development of the industry cluster district. In this way, we can lessen the waste emissions by increasing the resource utilization rate.
2. Adhere to water transfer projects like the South-to-North Water Diversion in China to get better water resource allocation. By replenishing clean water to places with little water or overusing water. In this way, the sewage irrigation problem caused by water shortage can be partly solved.
3. Delimit the scope of responsibility. Divide the river basin into multilayered areas, each family, company and government should take the responsibilities of supervision and current situation reporting. Set up surveillance stations in every village and city to receive the current situation of water and make plans and decisions about decreasing water pollutions.
4. Pay especial attention to and spend more money on forming pollution control apparatus, and focus on

controlling industrial pollution and domestic pollution. Project of water pollution on township governance should make scientific planning and step-by-step implementation, constantly improve the anti-pollution ability and ease the deterioration of water pollution problems. With the help of the new rural construction, and with overall planning the construction of new countryside and small town construction, more sewage and garbage disposal facilities should be constructed and the integration of sewage and garbage disposal should be realized. We should also build biogas pools to reuse crop stems, make full use of all sorts of living garbage and animal feces, and give full play to the multiple functions of gas such as energy, ecology, environmental protection and economy. With the help of these the amount of fertilizer can be reduced and an ecological agriculture can be formed step by step.

5. Strictly carry out legislation and enforcement procedures. In the countryside of China, corresponding provisions should be formulated and the legal system should be established according to the rural living garbage, sewage, the pollution index of township enterprises, based on the geographical characteristics and the situation of water environment protection and economic development. Set up concrete specification clauses and strengthen the responsibility to carry out the system, improve the enforcement of rural water pollution prevention and control of terms.

For the government to implement all the policies and control the polluting problem appropriately, there is still a long way to go. For instance, how to get actual supervision and make people understand the policies and the importance of environment protecting are tough questions to be solved. So introducing policies as well as improving the level of technology and education must be an effective way to step forward on the way to solve this problem.

For technology development:

1. Do more study about how to rationalize the layout of agriculture and manufacture. Firmly grasp the organic unity of small enterprise and agroecological system, to make up complex ecosystem with virtuous circle.

2. Strengthen the researches and extensions about ecological farming. As for agricultural producing and crop planting, we should accelerate to create high yield, high resistance crops as well as use less chemical fertilizers and pesticides, improve the utilization rate of pesticide and fertilizer, and change the traditional extensive mode of agricultural production toward precise ecological agriculture production relying on science and technology to improve agricultural productivity, stop the agricultural pollution from the source and to show the ecological, economic and social benefits made by agricultural work, realize the maximization of the overall benefits.

3. Realize the wastewater's recycling use. With the development of economy, industrial wastewater emissions will continue to increase. If we only attach great importance to the end, it is difficult to improve the present state of water pollution. So we must realize the wastewater's recycling and make use of principle of chemical oxidation to dispose heavy metal pollutants. Through oxidizing sedimentation, we can reduce the content of heavy metal pollutants and undertake metal recycling, thus the resource waste and the pollution discharge caused by metal smelting again can both be reduced.

4. Reduce the engineering cost and operation cost of sewage treatment plant. The current construction cost and operation cost of sewage treatment technology are both on the high scale, thus directly restricting the wide construction of sewage treatment plant. Only by relying on scientific and technological progress can we simplify and reduce sewage treatment procedures, can we reduce the volume of building, can we lower energy consumption, can we reduce the construction and operation of sewage treatment and management fees, and the construction of the sewage treatment plant can have broad prospects.

5. The water detection technology of YiLuo river basin should be established with the application of science and technology to strengthen the automatic information collecting and real-time monitoring of water resources. The corresponding analysis model should be set up according to the specific circumstances and the information can be disposed effectively, to make sure of timeliness, completeness and accuracy, for scientific decision-making.

Technology plays an important role in solving water pollution, so we have to use it properly or we will get the bad effects as much as they can do. We should analyze the pros and cons of every technological product, and make sure they will be used in a proper way.

For education popularization:

1. To strengthen the propaganda of water environmental protection knowledge. Environment should not just be improved by means of governance, more important is enhancing residents' environmental awareness through various aspects of publicity, especially to let each farmer know the consequences of environmental degradation, and combine water environmental protection knowledge with the practice activity, make the broad masses of farmers master the basic skills of taking precautions against pollution, such as the protection of rural drinking water source, the prevention and control of water pollution, the comprehensive utilization of agricultural waste, organic agriculture and organic fertilizer using, etc. With the enhancement of residents' environmental protection consciousness, the destruction activities of the environment naturally are reduced.

2. In view of the civic literacy, I suggest that a series of courses on food security and environmental protection should be set, according to the people of different ages and different education levels. We should take advantages of the acceptability and the memory ability of the teenagers, by strengthening the education of teenagers and enabling the teenagers to communicate more effectively with their family members.

The following are the suggestions put forward about the construction of curriculum system:

(1) The situation of food safety knowledge popularization and environmental protection should be investigated respectively according to large, medium and small cities and country. Sort out the needs of different age groups of students with different knowledge, and formulate the corresponding curriculum planning.

(2) Develop food safety knowledge of curriculum design from easy to difficult. When applied to different areas, the time and form to teach depends on the students' knowledge of food safety.

(3) Relevant knowledge and related principle on water pollution and food safety can be added to the high school chemistry course, and encourage students to carry on the relevant social survey and innovation research.

(4) Regularly organize the test and competition on the knowledge of water protection and food safety, and use other ways to fully mobilize students' learning enthusiasm, and progress of curriculum should be further adjusted according to the examination results.

(5) Establish a food safety scholarship to encourage students who put forward his innovation on food safety management method and the new understanding. Taking advantages of students' positive thinking, creativity and comprehensive knowledge, many innovation methods must come out and the food security problem can be solved better and better.

Conclusions

Water pollution is a widespread problem, it is more likely to appear in the rural areas during the process of industrialization and urbanization, and it has an important influence on the development of agricultural production and food security. Governance of water pollution problems should be done from the perspective of the administrative management, legal constraints, regulation of science and technology, so as to prevent, control and cure water pollution. we should strengthen Especially the food safety and environmental protection education system to make teenagers set up the protection consciousness and master relevant knowledge since their childhood , thus the environmental protection concept can deeply take root in everyone's heart and become a kind of subconscious behavior consciously. By mining young people's huge potential and inspiring their wisdom and sense of mission, the earth we live in must have a perfect future.

Works Cited

Ma Zhiyou. "A brief analysis of the hydrological characteristics in YiLuo River basin." Huangweigu Water Control Project Construction Authority. 1998

Zhang Shikun. "Analysis of Water Oollution Causes and Orevention and Control Measures in Yiluo River

" July, 2014

<http://d.wanfangdata.com.cn/Periodical_rmhh201407023.aspx>

Li Guoxue, Li Lianfang. "我国小城镇和乡村水体污染及控制对策" Review of China Agricultural Science and Technology. 2003

<<http://www.cnki.com.cn/Article/CJFDTotal-NKDB200304008.htm>>

"我国七大水系水污染防治工作及存在的主要问题" 31 Jul. 2012

<<http://www.doc88.com/p-417425328294.html>>

Home page of The People's Government of Henan Province

<<http://www.henan.gov.cn/hngk/system/2014/03/14/010458641.shtml>>

Meng Xuejing. "农村水污染经济问题研究" The periodical of Northeast Forestry University in China . 2007 <<http://cdmd.cnki.com.cn/Article/CDMD-10225-2007187627.htm>>

Zhang Suying. "江苏省淮河流域水污染防治现状及其对策" *Water Resources Protection*. 2009 (3)

<<http://www.cqvip.com/QK/71135X/201107/30468436.html>>

"黄委河南水文局监测伊洛河水污染纪实 " *News of China Hydrology* . 01 September. 2006

<http://www.hydroinfo.gov.cn/swxw/200601/t20060109_89945.html>

Yu Huajiang. "当前我国农村环境污染现状及其治理对策分析" *Nong Jia Zhi You Periodical*. 2009 16

<<http://wenku.baidu.com/view/66aaebcf050876323112121b.html>>

Zhou Zheng, Zhou Yinghui. "我国农村水污染现状及防治方法" *Northern Environmental X703*. 2011 06

<<http://www.cnki.com.cn/Article/CJFDTotal-NMHB201106038.htm>>

Home page of national bureau of statistics of the People's Republic of China.

<<http://www.stats.gov.cn/>>

"河南产业结构调整 and 工业化发展目前存在的主要问题及面临的任务" Henan Statistics

<<http://www.ha.stats.gov.cn/hntj/tjfw/tjfx/qsfx/ztfx/webinfo/2007/04/1224120934938978.htm>>

"伊洛河流域综合规划环境影响报告书"<<http://www.docin.com/p-786653476.html>>

Home page of The Critical Patented Projects in the Control and Management of the National Polluted Water Bodies<<http://www.chinacitywater.org/zhuanxiang/>>

“伊洛河流域综合规划环境影响评价”第二次信息公开 Web page of the people's government of Henan Province <<http://www.henan.gov.cn/zwgk/system/2014/03/07/010456559.shtml>>

"18 serious events of water pollution in recent China" www.aquasmart.cn 2013
<http://www.aquasmart.cn/news/Landscapewater/hyxw/45567_12.html>