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High Quality Development of Soil and Water Conservation in Soil and Water Loss Regions

Zhongsheng Guo[1,2*]

[1]*Northwestern A&F University, Yangling, China*
[2]*Institute of Soil and Water Conservation, Chinese Academy of Sciences and Ministry of Water Resources. Yangling, China*

[*]**Corresponding author:** Zhongsheng Guo, Northwestern A&F University, Yangling, China, China and Institute of Soil and Water Conservation, Chinese Academy of Sciences and Ministry of Water Resources. Yangling, China.

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Abstract

Water and soil conservation influences the quality of people's life and high-quality development. Since 2017, China government had put forward high quality development. we must carry out high quality development of Soil and Water Conservation. So, we should take the new theory of soil and water conservation as guide to reduce the disaster and meet the needs of people's good life and soil and water protection in the new era. The new theory of soil and water conservation includes that the soil and water loss is the process of transferring soil and water resources from one place to another; the influences of soil and water loss on social and social high-quality development have positive and negative effects. Soil and water conservation is to use some methods or measures to reduce soil erosion to soil allowable loss requirements. At the same time, efficient use of soil and water resources must be made to minimize the loss of life and property to develops the economy and improves people's income. The soil and water conservation measure must be managed in high -quality way.

Keywords: Soil and Water Loss, Soil and Water Conservation, Food Security, Ecological Security, Soil and Water Conservation Measure, Internation Cooperation, High Quality Development.

Introduction

Water and soil resources is the important resources of high-quality development. Water and Soil Loss affects the carbon and nitrogen cycle of terrestrial ecosystem, ecosystem products and services, the ecological environment and economic development, and ultimately the quality of life and sustainable development of the public. Over the past hundred years, great progress has been made in the work of soil and water conservation in China with the unremitting efforts of the vast number of soil and water conservation workers. For example, the State Key Laboratory of Soil Erosion and Dryland Agriculture had established in Yangling, China; Guo has distinguished the concept of cover degree and cover rate of water conservation forest [1-3]. The degree of vegetation coverage is the percentage of the total area covered by the vertical projection area of the canopy branches and leaves and the vegetation cover rate is the rate of high qualitied grassland or forestland area to the total land area in a region or a country. The degree of cover includes the effective cover degree , critical degree and Potential coverage [4, 5]. The establishment of a large area of soil and water conservation vegetation in the area of soil erosion and the establishment of large-scale soil conservation projects such as water conservation forest (or vegetation), wind-proof and sand forest and water source conservation forest construction standards and their construction scale, the effective coverage rate of wind-proof sand forest, the effective coverage degree of water conservation forest and the effective coverage rate of water conservation forest; the theory Basics of soil and water vegetation, including the theory of soil water resources utilization limit by plants and the soil moisture vegetation bearing capacity (Guo, 2002, 2003, 2004) has been established; the establishment of a large area of soil conservation vegetation in the area of However, due to the lag of theoretical research, the construction standards of soil and water conservation engineering measures and vegetation measures are low, the spatial allocation of soil and water conservation measures is unreasonable, the management of soil and water conservation attaches importance to quantity and despises quality, and the efficiency of soil and water conservation is low, which cannot meet the needs of high quality development of soil and water conservation in the new era [6-8]. Such incidents as drought,

forest fires, extreme weather and precipitation, hurricanes and flash floods will lead to widespread erosion of soil and water conservation vegetation, collapse of dams and other accidental incidents, resulting in serious soil erosion, destruction of farmland, villages, roads and vehicles, affecting transportation, food and ecological security, and causing great losses to the state and society. In order to overcome these difficulties and promote the high -quality development of soil and water conservation in the new era and meet the requirements of the public for soil and water conservation in the new era, it is necessary to develop a new theory of soil and water conservation. through Comprehensive analysis of relevant literature the new theory of soil and water conservation was put forward. To better understand the new theory of soil and water conservation and carry out high quality and sustainable. The purpose of this paper is to introduce high quality sustainable development goals of Soil and water conservation and new theory of soil and water conservation.

Research Method

As the author has conducted innovative research in soil and water conservation for over two decades, in the summer of 2019, he was invited to the renowned Northwest A&F University in China to teach the course of soil and Water Conservation and Ecological Security to students majoring in Soil and Water Conservation and Desertification Control. Due to the lack of suitable teaching materials and the need to cultivate the literature reading ability of graduate students, I arranged my graduate student Wang to sort out and analyze the literature on soil erosion and soil conservation in the past 100 years, and initially proposed the new theory of soil erosion and soil conservation, which will be published in 2020. Then, the literature on soil erosion and soil conservation up to now 3 has been collected and analyzed to improve the new theory of soil and water conservation and carry out high-quality sustainable development goals of Soil and water conservation and meet the needs of people's good life and soil and water protection in the new era [9, 10].

Result

High-Quality Sustainable Development Goals of Soil and Water Conservation

Academician Zhu Xianmo put forward "a 28-character strategy for territorial improvement on the Loess Plateau". Some people say that soil and water conservation is the cause of preventing soil erosion, protecting, improving and rationally utilizing soil and water resources, maintaining and improving land productivity, so as to give full play to the ecological, economic and social benefits of soil and water resources, and establish a good ecological environment". Although this definition played a role in the stage of improving the efficiency of soil and water conservation, because the definition did not put forward high-quality development goals of soil and water conservation, the scope of soil and water conservation measures was narrow, the construction standard was low, the management level of soil and water conservation was low, and the efficiency of soil and water conservation was low. Although the long-term soil and water conservation work has made some progress, every year due to serious soil erosion caused by the destruction of dams, embankments and Bridges and roads, causing tens of billions of economic losses and loss of life and property, seriously restricting the high-quality development of the country, soil and water conservation efficiency is far from meeting people's yearning for a better life and soil and water conservation needs [11-14]. To distinguish high-quality development goals for soil and water conservation from traditional soil and water conservation goal, we must clarify the high-quality sustainable development goals for soil and water conservation, which includes four points. The first is to reduce the soil loss in the soil loss area to the allowable soil loss level because soil and water loss is a natural phenomenon, we cannot eliminate it, contrary to the law of nature, but we can take effective control it to the allowable soil loss level; The second is to increase the use and economic benefit of land and water resource utilization maintained by soil, reservoirs and silting dams; The third point is to minimize the loss of life and property [15-20].

Theoretical Foundation of High-Quality Development of Soil and Water Conservation

New theory of soil and water conservation is the Theoretical foundation of high-quality development of Soil and water conservation, which included:

Soil and Water Loss

The term Soil and Water Loss is a natural phenomenon, originated in China as a technical term in the early 20th century. The term was applied to the Northwestern Loess Plateau of China in early 20th century. The forces forming soil and water are called Soil and Water Loss external forces. Soil and Water Loss external forces include water, wind and temperature (freeze-thaw), etc. The term erosion has long been used in geology, mostly to express the formation of external force flattening, and soil erosion first appeared in the book written by Kozmunk in 1909. It was then widely used and was introduced into China in the 1930s. Soil erosion refers to the whole process of soil and its parent material, as well as the destruction, stripping, transport and deposition of surface components of the land under external forces such as hydraulic, wind, freeze-thaw and gravity. Water power is the force produced by the flow of water; a wind is the magnitude of the force the wind exerts on an object. Temperature is the sign of the average translational kinetic energy of the molecular motion, and temperature is the collective expression of the molecular thermal motion. At present, people's understanding of water and soil loss is not uniform. It has been argued that soil erosion refers to "the destruction and loss of soil and water resources and land productivity under the action of external forces, including surface erosion and soil erosion; most believe that water and soil loss is equivalent to soil erosion, i.e. soil erosion by hydraulic erosion, wind erosion or gravity erosion, resulting in soil dispersion, transport and accumulation processes. Now, we enter a new period of high-quality development. To promote the high-quality development of soil and water conservation in the new period, we should first unify the understanding of water and soil loss. The authors believe that water and soil loss is the process of soil and water resources transferring from one place to another, which includes generalized soil erosion and narrow sense soil erosion. Generalized water and soil loss refers to the process of carbon and nitrogen circle, land productivity and ecological environment change caused by the transfer of soil and water resources induced by external forces. Water and soil loss in narrow sense is equivalent to soil erosion.

Consequences of Soil and Water Loss

Water and soil loss has obvious consequences on high quality

development, which can be divided into positive and negative effects as follows:

Water and soil loss leads to the decline or even loss of soil fertility and land productivity in water and soil loss region

The term soil fertility is the capability of soil to support plant production in agricultural contexts [21]. Serious Water and soil loss will affect carbon cycle and nitrogen cycle in agriculture ecological system and result in surface soil thinning of fertile soil in water and soil loss region, decrease of cultivated land area, decrease of soil fertility and decrease of crop yield (Walka, et al, 2020).

Soil and water loss influence people's daily transportation

Water and soil loss silts up rivers, lakes and reservoirs, destroys roads and farm land, destruct the village, and large amounts of sediment deposit in the lower reaches of rivers and estuaries, forming an alluvial plain and expanding the land area, see fig.1, which influence people's daily transportation. Floods, landslides, mudslides and other serious soil erosion siltation channels, lakes, reservoirs, see figure 1 and 2.

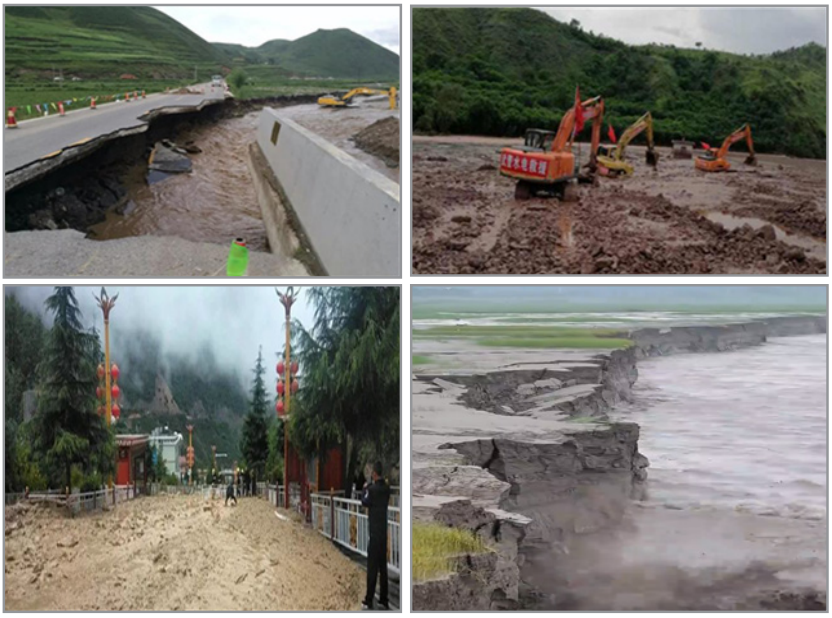

Figure 1: Water and soil loss destroys roads (the left photo above), farm land (the right photo above and below) and village (the left photo below) in China

Water and Soil Loss Pollution Water Quality and Affects Ecological Balance

Water and soil loss accelerates non-point source pollution. In the event of heavy rain, strong surface runoff will pile up the surface garbage into the river, seriously affecting the water quality of the river. A typical example is the fact that the water quality of the Yangtze River is being polluted.

Typhoons, haze, dust and dust storms affect people's health, travel and social activities.

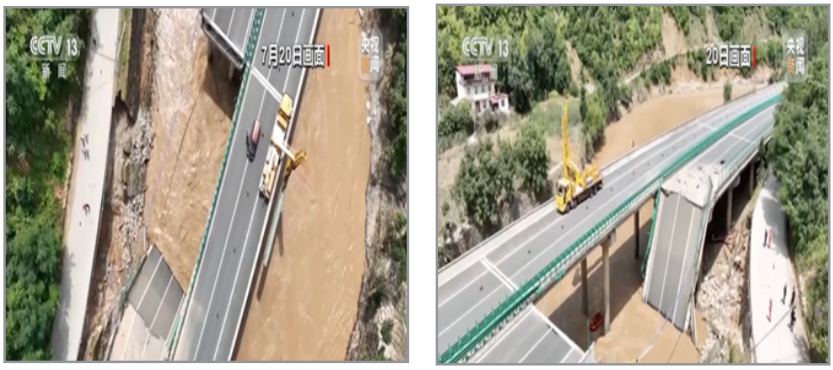

Figure 2

Fig. 2: At around 20:40 on the 19th, 2024, a sudden rainstorm and flash flood in Zhashui County, Shangluo City, Shaanxi Province of China, caused the partial unilateral collapse of No. 2 Bridge in Yanping Village in the direction of Shanyang section of Shuiyang section of Danning Expressway, with a length of about 40 meters. The disaster caused many deaths and lost contact. Confirm that 25 vehicles fell off the bridge and 43 people were inside the car.

With the development of economy and society, people are more and more demanding on health, and travel and social activities are becoming more and more frequent, while typhoons, haze, dust-raising weather and dust storms affect flights and road traffic, and seriously affect people's rapid travel and social activities.

Water and soil loss accelerates the formation of unique landforms and promotes the development of ecotourism.

Figure 3: Water and soil loss promotes the formation of unique landforms and the development of ecotourism In China

Soil and rock through hydraulic, wind and freeze-thaw and other external forces of the joint action, forming numbers of magic, wonderful natural landscape, which accelerates the development of environmental tourisam and get rid of poverty and become better off. For example, Keshiketeng stone array scenic spots in the northeast of Keshiketeng county, Danxia natural scenic spots located in Yulin city and zhashui cave located in the Qinling Mountain and so on. The zhashui cave is the result of long-term dissolution of groundwater. Calcium carbonate in limestone forms micro-soluble calcium bicarbonate under the action of H2O and CO2. Because the limestone layer contains different lime quality and different erosion degree, it is gradually dissolved and divided into non-dependent, diverse, steep and beautiful peaks and cave with strange landscape, which promotes eco-tourism and local economic development. Hukou waterfall is still Hukou waterfall but now has become a tourist hot spot, see fig.3. Unique landform promotes development of ecotourism in China, there are a lot of people to enjoy the unique landform in Leisure time or holidays.

Water and Soil Loss forms Silt Plain in Lowland and Expands Land Area in Estuary Area

A large amount of sediment deposits in the estuary area, forming a silt plain and expanding the land area with increasing time, which increase nitrogen density in soil, soil fertility, land product and CO2 fixation. For example, the Chongming Island at the mouth of the Yangtze River basin and the Huanghe Delta at the mouth of Yellow River. At first the Chongming Island was just a small sand dune, and as the sands hit and settled, the sand dunes grew larger and became an island where fishermen lived.

Soil and water conservation workers should broaden their horizons, make best use of the advantages of water and soil loss and bypass the disadvantages of water and soil loss to meet the requirements of rapid and high quality economic and social development, especially to strengthen the prediction, prediction and prevention of serious soil erosion phenomena caused by typhoons, haze caused by strong winds, dust-raising weather and sandstorms.

Soil and Water Conservation

Soil and water conservation is to use some certain measures and technologies to reduce the loss of soil and water to a certain goal, soil allowable loss, making efficient use of conserved water soil and water resources, and minimize the loss of life and property. For example, introduction of flood irrigation with high sediment concentration to form high-quality farmland, and using the water source of the river, Haizi (Lake) and reservoir in the sand area, draw water by gravity or by machinery, Wash Sand Dune by hydraulic power, and carry sand to the place and form high-quality farmland, or use runoff and topography to promote Eco-tourism, such as Shapotou and Hukou tourist attraction in the China loess plateau.

Soil and water conservation measures can effectively conserve soil and water [22]. Soil and water conservation measures include soil and water conservation engineering measures, soil and water conservation farming measures and biological measures for soil and water conservation. Other soil and water conservation measures, such as wind power and solar power generation, are also included to reduce near-surface wind speed and temperature and facilitate the growth of soil and water conservation vegetation. In the restoration of vegetation, natural forces can be used to restore vegetation in no man's land; however, in areas where there is a population, artificial interference should be used to restore vegetation in order to make the vegetation ecosystem goods and services to meet the needs of human production and life.

Since 1950, soil and water conservation in China has made great progress. A large area of soil and water conservation vegetation has been established in water and soil loss areas, and a large number of reservoirs have been built; some water and soil conservation measures such as water and soil conservation projects such as dams or levees have been set up along the rivers of the Yellow River and other soil erosion areas, which have made great progress in controlling water and soil loss below the allowable amount of soil erosion and promoting regional economic development. However, due to the lag of theoretical research on soil and water conservation, the construction standard of soil and water conservation measures is low and imperfect, and the spatial allocation of soil and water conservation measures is unreasonable. For example, silt storage dam for farmland building has played an important role in preventing floods, consolidating the return of farmland to forests or grass, safeguarding ecological security and food security, promoting the development of economy and social stability and so on. However, in the construction of silt storage dam, the problems of low quality of construction, serious disease-risk dam, poor management of reconstruction and so on, especially the large number of small dams, have not been paid enough attention to. Therefore, it is urgent to strengthen the study of soil allowable loss on different underlying surfaces, formulate high quality standards for soil and water conservation engineering and vegetation construction, and carry out spatial optimal allocation to obtain maximum soil and water conservation efficiency. The space optimal configuration is expressed

by the spatial optimal configuration coefficient. Spatial optimal allocation coefficient means that in a water and soil loss area or watershed, soil and water conservation funds or measures may have different allocation methods, and different allocation methods bring different soil and water conservation efficiency, which is different surface runoff and soil loss. The optimal allocation of space refers to the allocation that bring maximum soil and water conservation efficiency.

High Quality Management of Soil and Water Conservation

In 1992, the central issue of the United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil, was sustainable development, which emphasized that sustainable forest development was an important component of sustainable economic development. In 1992, the Chinese government submitted its report on China's environment and development to the United Nations Conference on Environment and Development, which laid out the basic position and views on China's sustainable development. In 1994, the Chinese Government made it clear that it would implement a strategy for sustainable development in its economic and social development.

In the field of soil and water conservation, it is necessary to implement the high quality and sustainable management of soil and water conservation measures to realize the high quality and sustainable development of soil and water conservation. For soil and water conservation engineering measures, it is necessary to improve the design standards and formulate corresponding emergency plans to prevent the occurrence of dam break and dam break caused by hurricanes, tsunamis and heavy rain caused by extreme weather. In the early morning of august 20th, 2019, due to heavy rainfall, a huge debris flow broke out in the yazigou valley, less than 300 meters from the dam of Wolonglongtan hydropower station in Sichuan province, China. At that time, the staff on duty found that the dam water level rose, the water level difference before and after the barrier quickly increased, immediately stopped to avoid the peak, open the floodgate. When the opening of the three sluices is less than 1 meter, the swift and violent debris flow will break down the power transmission line of the working power supply, resulting in the interruption of the power supply of the sluice, the flood sluice cannot continue to rise, resulting in the rapid rise of water level and the occurrence of flood dam events. For the biological measures of soil and water conservation, according to resources use limit by plants, including spatial, soil water and Soil nutrient resources use limit by plants, the vegetation carrying capacity, mainly including spatial, soil water and Soil nutrient vegetation carrying capacity and the resources use limit by plants and the critical period of plant resources relationship regulation including the critical period of plant spatial, soil water and soil nutrient relationship regulation, it is easy to adjust the plant resources relationship based on the vegetation carrying capacity in the critical period of plant resources relationship regulation to realize the sustainable utilization of natural resources and the high quality and sustainable development of soil and water conservation [23-26].

International Cooperation of Soil and Water Conservation

Typhoon No. 7 "Moji" in 7 September was happened in 2024. Facing the widespread flood crisis caused by Typhoon, Vietnam took the direct opening of sluice to release the flood, which cause water level of Nanning River in Guangxi Province rise sharply, and many areas have been hit by floods. The reason why the Yongjiang River was affected by Vietnam's sluice opening behavior is that it is formed by the convergence of two river systems, Zuo Jiang and You Jiang. The source of Zuo Jiang is from the North Ling Mountains in the Lang Son Mountains of Vietnam. When Vietnam opened the sluice in the upper reaches of the Zuo River, the water level of the river rose inevitably, leading to serious flooding.

This practice of Vietnam is undoubtedly a typical act of self-interest at the expense of others, but it is inexplicable that they have in turn asked our country not to open the sluice and release water in the upper reaches of the Panlong River and the Red River, such a request obviously lacks sufficient grounds and basis.

Recently, the Vietnamese Ministry of Foreign Affairs and its agencies in China have urgently communicated with the Chinese foreign ministry and Yunnan Province, implore the Chinese side to suspend the operation of opening floodgates in the upper reaches of the Panlong River and the Red River to assist Vietnam in coping with the current flood challenges.

Rivers in Vietnam were put on high alert as Typhoon Capricorn brought the worst flooding in nearly two decades, leaving 182 people dead and 145 missing. What's more, once the dam breaks, Hanoi, the capital of Vietnam, will also face the threat of being flooded.

It is worth noting that the Panlong River and the Red River are both international boundary rivers between China and Vietnam. Panlong River originates from Honghe Prefecture in Yunnan Province, flows through Wenshan Mountain and flows into Vietnam. The Red River also starts in Yunnan Province and ends up in northern Vietnam. Under the influence of typhoon "Moji", the Panlong River Malutang hydropower station in China is also under great pressure. If the water level continues to rise and exceeds the safety standard, the safety of the dam will be in jeopardy. At that time, whether China opens the sluice or not, it will have an impact on Vietnam that cannot be ignored.

In the face of Vietnam's request, China did not fully accept, but adopted a more cautious attitude. We have decided to reduce the amount of water released from the gates from 250 cubic meters per second to 200 cubic meters per second, and to postpone the release time. Such a decision not only reflects understanding and help to Vietnam, but also ensures China's own security interests. China does have the bearing of a major country.

In contrast, the Vietnamese side, without full consultation with China, arbitrarily opened the sluice and released water, which brought a lot of flood losses to Nanning and other places in Guangxi. In contrast to this behavior, the attitudes and ways of China and Vietnam in dealing with international river issues are particularly clear.

Our construction of Malutang hydropower station in the upper reaches of the Yuan River has not only brought benefits to Wenshan and Xishuangbanna in Yunnan Province, China, but also produced positive flood control effects in Ha Giang, Xuan Giang and Hanoi in Vietnam. However, Vietnam's own water infrastructure is weak, which is one of the important reasons for its

severe flooding. It is obviously unfair and immoral for them to try to shift the disaster onto our country. As neighbors separated by a strip of water, only by adhering to the principle of sincere cooperation and mutual assistance can the two sides jointly meet challenges and achieve a win-win situation, rather than blindly pursuing their own interests and ignoring the impact and responsibilities on other countries.

Conclusion

Now, Chinese economic and social development had entered a new period of high-quality development, and the public has put forward higher demands on soil and water conservation, which requires the protection of air quality, life, property and health, and ensures the safety of food, ecology and transportation, so the work of soil and water conservation has entered a new stage. In order to ensure the safety of people's lives and property and meet the needs of people's happy life in the new era, we are required to raise the level of understanding of soil and water conservation, dialectically and comprehensively view the consequences of soil erosion, take timely and effective measures to deal with serious soil erosion caused by sudden events such as mountain torrents, hurricanes, sandstorms and other serious accidents that affect the safety of public life and property. To ensure the sustainable use of natural resources, high-quality development of agriculture in soil erosion areas. Coordinate and promote comprehensive prevention and control of non-point source pollution, restoration of degraded ecosystems and improvement of living environment in soil erosion areas, and realize the concept of co-construction and co-treatment to achieve rural revitalization and build a beautiful China, to meet people's yearning for a better life and the need of high-quality development of soil and water conservation. In order to ensure the safety of people's lives and property and meet the needs of people's happy life in the new era, we are required to raise the level of understanding of soil and water conservation, dialectically and comprehensively view the consequences of soil erosion, take timely and effective measures to deal with serious soil erosion caused by sudden events such as mountain torrents, hurricanes, sandstorms and other serious accidents that affect the safety of public life and property. To ensure the sustainable use of natural resources and high-quality development of forest vegetation and crops in soil erosion areas. Coordinate and promote comprehensive prevention and control of non-point source pollution, restoration of degraded ecosystems and improvement of living environment in soil erosion areas, and realize the concept of co-construction and co-treatment to achieve rural revitalization and build a beautiful China, to meet people's yearning for a better life and the need of high-quality development of soil and water conservation [27, 8].

In the future, we should strengthen basic research of soil and water conservation, such as the relationship between different soil and water conservation projects, biological measures and soil allowable loss in different soil erosion area, and determine air quality and soil pollution degree, largen the scope of soil and water conservation measures and strengthen the early warning research on risks such as mountain flood, landslide and debris flow caused by natural disasters such as typhoons and tsunamis in soil erosion area by using Drones and Beidou satellites, and formulate high standard soil and water conservation measures on the basis of new theory of soil and water conservation, and carry out spatial optimization of soil and water conservation measures and international cooperation to reduce the soil and water loss to the limit, make most of conservated soil and water resources in soil and reservoir and maximize the loss of life and property and ensure the high-efficiency use of soil and water resources in soil erosion area and the safety of artificial ecosystem to improve the efficiency of soil and water conservation and meet the needs of the public for food, ecological security, road unblocked and ecotourism, and provide theoretical basis and scientific and technological support for economic and social high quality development.

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Competing Financial Interests statement

There is not Competing Financial Interests

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