On Living Dam Planning for Earthquake Prevention and Disaster Reduction

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Abstract. Based on the comprehensive research on the technology of "geographical name code", "modern nonmetallic structure", "high temperature fermentation biogas digester waste disposal power generation", "Internet plus earthquake prevention and disaster mitigation APP" and "new theory of securities public investment", this paper puts forward a new concept of "earthquake prevention and disaster reduction" in dam, which will obviously alleviate the shortage of farmland, cross river traffic, small hydro-power development in mountainous areas, and environmental protection waste. One belt, one road area, and the county level place code are proposed to lay the foundation for the new intelligent platform for earthquake emergency international earthquake preparedness and disaster reduction. The basic theory of securities public investment and its application in the PPP project for earthquake prevention and disaster mitigation are put forward, and the specific planning plan and budget for the construction of the dam in the poverty-stricken mountainous area are put forward. We will demonstrate the one to one belt, one road and one country. This paper is originated from practice and has a new idea, which will obviously promote the new development of human earthquake prevention and mitigation.

1. Concept of Living Dam
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The concept of Living Dam settlement comes from the site investigation of Wenchuan 8.0 earthquake on May 12, 2008 (512 earthquake). Now, it is associated with the construction demand of China's earthquake area, that is, there are more people and less land in China, many parts of the mountain area have not been lifted out of poverty, public buildings and houses are often built on the hillside, facing the threat of large earthquake collapse, which is a high difficulty problem of the earthquake prevention and disaster reduction.

For example, the "512" Wenchuan earthquake in 2008 killed 69227 people, injured 374643 and left 17923 missing. The reason for the disappearance is that a large area of landslides buried buildings and people alive together in the landslides, resulting in "no dead body", which shows that modern society is very inhumane to the missing, but the modern people have not enough strength to dig out the body of the missing from the landslides, until now, the relatives of the missing do not recognize the death of their relatives. China is used to "see the dead." Corpse! There is no good way to solve this major problem, only to avoid landslides as much as possible, to avoid back and forth, to occupy and level farmland for construction, and to make the cultivated land less and less.

The concept of this paper originally comes from the fact of earthquake damage investigation in Deyang City area, Sichuan Province. The original point is to thoroughly solve this outstanding
problem of the earthquake prevention and disaster reduction, which can not be properly solved up to now. The dam can avoid the landslide, and also support the soil mass on both sides to stop the large-scale landslide, one for two.

The dam is built on rivers and valleys, mostly with mountains on both sides. There are obvious ground motion terrain influence conditions, that is, it is generally considered that the vibration in the area of 6 times the height of isolated mountains is significantly reduced, and it is an earthquake safety island area. Because the mountains are pressed, the foot of the ground mountain is not easy to shake up by strong ground motion, and the earthquake motion at the top of the mountain will be significantly enlarged, that is, it is reasonable to choose the foot of the mountain for the construction of earthquake resistant buildings. Obviously, there are mountains on both sides of the dam, so the ground motion is smaller, and it is also an earthquake safety island. Therefore, the bottom of the valley is a natural favorable area for earthquake prevention and mitigation. The seismic force must be reduced and should be used scientifically. That is to say, the ravine ground motion of dam construction must be the smallest, and the earthquake prevention and disaster reduction should be fully utilized. Now, it is basically not utilized, and it is worthy of innovative research, demonstration and promotion.

2. Modern Nonmetallic Structure

The gravity dam needs to be built in the river section with flat terrain, but it can't be built in the section without flat terrain in the mountain, which results in the loss of rainwater potential energy on the mountain. The modern nonmetallic structure adopts the pile column cantilever beam structure to retain the water, and the water potential energy can be obtained by building the dam, and small hydropower generation can be carried out. A series of dams in a mountainous basin can establish a pumped storage system, complete the energy storage of wind energy, solar energy and other new energy in the coastal area of the basin, and complete the optimization of peak load regulation of power use. This is the theme of "coordinated development of population, resources and environment" in the 21st century, that is to say, the most important energy in resources is electricity, the key of which is electricity storage, and the most reasonable peak regulation of water and electricity storage. Therefore, this paper also discusses a very important theme.

3. Modern Civil Engineering

The technology of living dam planning has a wide range of contents, which basically involves the technical work of the Ministry of water resources, the Ministry of construction and the Ministry of communications. It is a real civil engineering construction task. Due to the division of various ministries and commissions, it was difficult to integrate the planning and design in the past, that is to say, houses and vehicles could not be built and shared on the dam, and there were also reasons why the construction technology was still backward, and there was no comprehensive use of the dam. Modern nonmetallic structure is modern civil engineering. It has been able to integrate water conservancy, construction and transportation. It can be done in the remote and poverty-stricken mountainous areas. The concept of civil engineering of the Chinese nation should be restored and modern nonmetallic structure should be innovated.

4. Capital Market of Living Dam

Earthquake prevention and mitigation need a lot of capital investment. It is necessary to study the branch theory of securities public investment and combine it with Public-Private Partnership (PPP) project. Dam planning can become a necessary carrier for earthquake prevention and mitigation enterprises to find new channels of securities investment. Through this planning research, the investment channels of earthquake prevention and mitigation funds need to be expanded. The public investment in securities is also to make profits and returns. The dam planning can design a good technical scheme, and give huge returns to investors through the development of electric energy and energy storage and peak regulation, environmental organic waste treatment and environmental protection, bridge transportation and transportation, aquaculture, pension and entertainment, real estate development around the dam, etc.
5. The Purpose, Object, Framework, Main Contents of the Planning

The purpose of this planning is to improve the technology level of earthquake prevention and disaster reduction. The purpose of comprehensive innovation is to make use of the valley area to reduce the vibration, to save the construction land, to develop the small hydropower in the steep mountain area, to develop the aquaculture in the valley area, to ferment and generate electricity in the high temperature biogas digester of the organic waste on the dam area, to plan and design the water shelter after the strong earthquake. The significance of studying the feasibility of the combination of the investment in dam securities and PPP project lies in the restoration of the Chinese concept of long life of nonmetallic civil structures, the integration of water conservancy, construction and transportation, which are included in civil engineering, and the provision of new optional technical support schemes for poverty alleviation in the poor areas of the earthquake.

The earthquake prevention and mitigation method includes six links: earthquake monitoring, prediction, defense, emergency response, disaster relief and reconstruction, forming three systems: earthquake monitoring and prediction, earthquake disaster prevention and earthquake emergency response. The research object of this subject will be planned around the above six links, and the overall framework is to comprehensively plan a new earthquake prevention and mitigation structure in the valley based on the requirements of each link of the earthquake prevention and mitigation method. The seismic fortification scheme of the dam earthquake disaster system is given in the key planning and design.

The main objectives of this planning are as follows:

1) The abbreviation of place name can be used as the regular website of dam site to solve the bottleneck problem of Chinese characters in artificial intelligence. The Belt and Road Initiative 40 counties and districts, which are the abbreviation of the county names in the area of the first place in China, are set up on the basis of the abbreviation of geographical names in the original area of China. For example, there are 5 districts and counties in five regions of Ningxia (Yinchuan, Shizuishan, Wuzhong, Guyuan, Zhongwei, I1, I2, I3, I4, i5 respectively), and Italian place names also use I. by using other I6 to I0 and alphabetic resource combination, the place names of 20 regions and counties under their jurisdiction are simplified to make the platform international. At the same time, combined with the recent regional earthquake safety evaluation project, the abbreviation of the place names of the development zones and industrial parks under the districts and counties is compiled to each plot, and the demonstration of the establishment of the abbreviation of the place names of the big database of earthquake prevention and disaster reduction is made. This work will directly affect the application of artificial intelligence in the next generation of China's seismic parameter zoning map.

2) It also depends on the cooperation of local seismological departments to screen the above primary river basins and find out the most suitable river basins for dam system construction. First of all, we need to collect the hydrological data of the basin, as well as the planning situation of urban areas, towns and rural areas, analyze the water conservancy, construction and transportation needs, start data collection in remote and poor mountainous areas, and carry out precise poverty alleviation and assistance work, so that the local education can be popularized and life can be improved.

It is planned to carry out the regional seismic safety evaluation for all river basins, select reasonable seismic fortification ground motion parameters for the dam site, develop the regional seismic safety evaluation technology in China, and truly use the comprehensive probability method of real seismic risk analysis. Using the construction and planning advantages of the main technical force of this project, the conceptual design of the dam is carried out, and the budget analysis report is made, so as to obtain funds for the project establishment and construction of the dam at the same time. This concept design is more effective in the high seismic intensity fortification area.

3) According to the theory of securities investment, this paper puts forward the concept of securities public welfare investment. Securities investment should have income. The investment of earthquake prevention and disaster mitigation in dam will also have income. The income also lies in
the government's investment in public welfare. Design as many structural projects as possible to generate income, such as hydroelectric power generation, biogas power generation and its organic fertilizer plants, pumped storage, water entertainment, aquaculture, bridge fee income, etc. according to the conceptual design budget, analyze the relationship between input and output, study the proportion of income, arouse the huge input of national public welfare funds and social funds to the dam, and fundamentally improve As for the lack of construction land in mountainous areas, Sichuan and other mountainous provinces should be supported to build up small hydropower projects and obtain huge economic, social and environmental benefits. The results of the project should be applied to the capital cities of mountain provinces as soon as possible, and the profits will be endless.

6. Research Result
(1) Research on the improvement of international and grass-roots place names abbreviation:
   Research and development of simplified codes (3 characters) for county names in Hong Kong, Macao and Taiwan.
   The Belt and Road Initiative: 01 Azerbaijan, 02 Belarus, 03 Brunei, 04 Chile, 05 Cyprus, 06 Czech, 07 Djibouti, 08 Egypt, 09 Kazakhstan, 10 Kenya, 11 Kyrgyzstan, 12 13 Laos, 14 Mongolia, 15 Mozambique, 16 Nepal, 17 Philippines, 18 Portugal, 19 Mozambique, 20 Switzerland, 21 Uzbek, 22 Stan, 23 UAE, 24 Zambia, 25 Austria, 26 Cambodia, 27 Ethiopia, 28 Greece, 29 Hungary, 30 Italy, 31 Malaysia, 32 Myanmar, 33 Pakistan, 34 Papua New Guinea, 35 Singapore, 36 Thailand, 37 Vietnam, 38 Indonesia, 39 Ukraine, 40 Russia. Research and development of county-level geographical name abbreviations (3 characters) in 40 countries and regions including.
   Based on the domestic regional seismic safety evaluation work, the application demonstration of regional seismic safety evaluation of industrial park with the place name code (6 characters) arranged from district to county is completed.

(2) Conceptual design of dam:
   Carry out regional seismic safety evaluation in the planned River Basin of the dam site, and define the seismic fortification ground motion parameters of the dam site.
   Based on the construction of a hope primary school, the conceptual design of structural seismic fortification is carried out. The basic method is to simulate the size of gravity earth rock dam: for example, a reinforced concrete dam with a width of 100 meters and a height of 15 meters can be built on the ditch and across the river, with a width of 100 meters and a width of 10 meters along the river. According to the hydraulic structure specification, it is 6 independent structures with a width of 15 meters across the river, with temperature extension between the structures shrink the seam. The remaining 10 meter wide part of the middle river crossing is designed as sluice gate, ship lock, etc. if necessary, an extraordinary spillway can also be built. The shape of the dam is basically similar to the trapezoid of the earth rock dam. The method of reinforced concrete structure design is adopted, and the steel bars are replaced by fiber bars to realize the modern nonmetallic structure. As a building planning and design, when the site is selected, the design renderings need to be completed, and then the construction cost estimates need to be carried out to find the construction units that can invest to undertake the construction.

(3) Economic planning for dam settlement: conduct a comprehensive analysis of the possible income from dam settlement, including the income from hydropower, bridge tolls, biogas projects (biogas power generation, biogas slurry, biogas residue), peak shaving income from pumped storage power, entertainment income from water playground, aquaculture income, etc., study the feasibility and rationality of securities investment in dam settlement public welfare projects, and analyze that the project has not been purchased the Belt and Road Initiative will be a good investment benefit. Because the nine year compulsory education school can get the government's input. The electricity generation to the state can also be obtained by the NDRC without interest input to the generating equipment. It can apply for the investment of the Belt and Road Initiative sub investment bank or the Agricultural Development Bank's interest free loan, and complete the feasibility analysis of the investment and issuance of the incoming in the dam.
7. Acknowledgement
China Association of science and technology veteran fund, 201824. Research on Humanities and social sciences of the Ministry of education, 17yjc760059.

8. References
[1] Li Youfang, abbreviation of county place names in China, Earthquake Press, and December 2019; (in Chinese)
[2] Li Youfang, et al. Some opinions and suggestions on the national standard "green city evaluation index", vitality, 2018.559; (in Chinese)
[3] Li Youfang, et al., "study on the abbreviation of county-level place names in the capital area", city and disaster reduction, issue 1, 2019; (in Chinese)
[4] Li Youfang, et al., "study on Optimization of structural vibration reduction and isolation design", world earthquake engineering, Sep. 2019. (in Chinese)