

Ecological Compensation for Dammed Rivers

Dong Zheren

Chairman of Global Water Partnership - China

Global Water Partnership - China

Outline

- 1. The Stresses of Dams on River Ecosystems
- 2. To choose the optimized strategies in nature-society-economy compound ecosystem
- 3. Feasibility to actualize ecological compensations to damed rivers :
technology—mechanism

Foreword

- Some domestic experts criticize the hydropower development plan on rivers in southwest China. They protest to “preserve a aboriginal river”.
- The debates on dam construction initiated in the Western Countries in 1970`s has spread to China after 30 years.

1. The Stresses of Dams on River Ecosystems

- **River continuum consists of not only hydrological continuity of streams, but also the continuity of mass transportation, nutrition substances, biotic community as well as information flow.**

1. The Stresses of Dams on River Ecosystems

- Daming causes river discontinuity and as a result radically changes its natural evolution process, forming “ecological retardarce”.

1. The Stresses of Dams on River Ecosystems

- The fact is existed that dams have stresses on river ecosystems. We can't blench. We should face up to these kinds of negative effects.
- However it is more important to actively conduct studies on technologies, policies and measures for river`s ecological compensations and to explore a new mode for environment-friendly dam construction.

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **Resourcism** claims : seeking maximum sustained yield of renewable resources .
- **Preservationism** : excluding human inhabitation and economic exploitation from remaining areas of an undeveloped nature .

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **Both philosophy are unilateral to deal with economic development of human communities and the maintenance of healthy ecosystems.**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **To put the problem in the compound ecosystem of nature, society and economy, and to analyze how to seek the balance point between satisfying social and economic demands of human communities and causing no or a little damages to ecosystem healthy**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **The viewpoint of simply opposing to any dam construction and claiming the decommissioning of dams widely is undoubtedly impractical for economic development .**
- **On the contrary, any action of blenching the stresses of dams on ecosystems will undoubtedly be harmful for the long-term benefits of mankind.**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **There is no engineering technique that has great benefits and no any harm in the world.**
- **The dialectic thinking is to balance the advantages and disadvantages and to gain profit and reduce loss .**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **Dam construction meets many demands for flood control, power generation, irrigation, water supply, navigation and so on.**
- **Social economy can't develop without dams and reservoirs.**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- In 2002, in China the yields of energy resources are 1.387 billion tons of standardized coals. Among them, there is 1.38 billion tons of coal, taking first place in the world.
- Total generator capacity is 357 million kW. Power generation quantity is 1654 billion kWh annually. China has become the second large country in energy consumption in the world.

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **China is facing seriously environmental challenge in the development of energy resources.**
- **The discharge of sulfur dioxide of China is the most in the world and the discharge of carbon dioxide is the second in the world, only inferior to the USA. The energy composition of coal as the major energy resource is the main reason of serious atmosphere pollution.**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **In 2020, the demand for energy resources would be 2.5 to 3.3 billion tons of standardized coal, at least twice that in 2000.**
- **Till 2020, sulfur dioxides, nitrogen oxides will be up to 40 million tons and 35 million tons separately in the condition of the least contaminant amount coming into being if no measure of desulfurization and denitrification is taken.**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **Up to 2020, China will be confronted with high international pressures in the aspect of global climate changing.**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **Why to develop hydropower?**
- **The composition of Chinese energy resources**
- **Water resources, coal, petroleum, gases take the position of the 1st, 3rd, 12th, 22nd in the world respectively. Hydropower development degree in China is only 23%, lower than that in developed countries, where 60% or more hydropower resources has been developed**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **Totally 400 million kW hydropower is feasible to be exploited developed in China. If 50% of it is developed, corresponding 600 million tons of coal can be saved annually. This amount is about the 1/2 of the total coal combustions of China in 2002.**
- **It is of great significance in decreasing the discharge of greenhouse gases, which is a great contribution in ecological environment protection for the world.**

2. To choose the optimized strategies in nature-society-economy compound ecosystem

- **Hydropower is one kind of recycled clean energy resources without any pollution to atmosphere and wastes. As long as the sun does not extinguish, water resources will be available.**
- **Dam construction should be comprehensively considered in global nature-society-economy compound ecosystem.**

3. Feasibility to actualize ecological compensations to damed rivers

- **Dam Removal or opposition of dams is not the unique choice to protect ecological healthy of rivers.**
- **It is feasible to construct environment friendly dams by conduct ecological compensations to rivers through engineering, biological and management measures to prevent or alleviate stresses on dams to river ecology system.**

3.1 Environment evaluation of dam projects

- **Environment Impact Assessment Law of the People's Republic of China (EIAL) issued in 2002.**
- **It needs to formulate Detailed Rules and Regulations for the Evaluation of Dam Projects**

3.1 Environment evaluation of dam projects

- Present EIA of a dam is usually conducted according to the requirement of an individual subject or local function, such as to separately study the protection of endangered or special animals and plants in reservoir inundation areas or to study the influences on water quality, etc.
- This work lacks of systematic analysis and evaluation on the interaction, interrelation, interdependency, reciprocal transformation of all the components of the ecosystem.

3.1 Environment evaluation of dam projects

- **Emphases of EIA of dam projects should be put on the influences of damming on the healthy and sustainability of river ecosystem, including influence analysis, prediction, and evaluation of river ecosystem configurations and functions. Pay much attention on the change of biodiversity.**

3.2 Explore and develop Ecological-Hydraulic Engineering

- **Ecological engineering was defined as: “the design of sustainable ecosystems that integrate human society with natural environment for the benefit both.”**

3.2 Explore and develop Ecological-Hydraulic Engineering

- **Eco-Hydraulic Engineering is a branch of hydraulic engineering science. It is an engineering science to study the principles and technical methodologies for hydraulic engineering to meet the needs of mankind and at the same time to take account of the health and sustainability requirements of aquatic ecosystem**

3.2 Explore and develop Ecological-Hydraulic Engineering

- **The tasks for river ecological engineering**
- **The first is the improvement of hydrological conditions.**
- **The second is the improvement of river geomorphological characteristics.**
- **The third is the restoration of special or endangered species.**
- **The total target is to improve river ecosystem configurations and functions. Its indicators are the increases of bio-community diversity.**

3.3 Value assessment of river ecosystem services

- **The services provided by river ecosystem maintain the condition that human exists, and offer various welfares for the communities.**
- **These include: the maintenance of biodiversity; the supply of food, medicine and materials; the purification of freshwater; water conservation and the alleviation of draught and waterlogging; the stabilization of local climate etc.**

3.3 Value assessment of river ecosystem services

- **For a long time, people consider that river ecosystem services are free bestows of the nature and could be gained without refunds.**
- **In commercial society, the tangible ecological products can be considered, while the large amounts of non-material values of ecological services are often ignored.**

3.3 Value assessment of river ecosystem services

- **River project bring huge and direct economic benefit for mankind, but some services of rivers are lost.**
- **How to assess the values of these functions is the basis for building ecological compensation mechanism**

3.3 Value assessment of river ecosystem services

- In 1992 “Agenda 21” passed by United Nations’ Conference on Environment and Development ((UNCED) clearly states that it is necessary to **conduct studies on the evaluation of ecological values and natural capital.**

3.3 Value assessment of river ecosystem services

- In 1994, “**China’s Agenda 21**” puts forward that “Traditional economy indicators, GNP or GNP, neither reflect ecological damage, environmental degradation and the loss of resources caused by economic growth, nor calculate the values of non-commercial labor services,…….”

3.3 Value assessment of river ecosystem services

- **“Therefore, it is necessary to establish an integrated accounting system, which considers resources and the environment as well as the economy, so as to monitor the performance of the entire national economy.”**

3.3 Value assessment of river ecosystem services

- It has great significance to evaluate and quantify the values of river ecosystem services, and integrate this into the national economic accounting system by laws.
- **1.** The short-term activities for obtaining direct economic benefits can be avoided through comparing its direct social economy benefits with the losses of ecosystem services when make decisions for big hydraulic projects.

3.3 Value assessment of river ecosystem services

- **2** It will help to urge project owners to take more ecological compensation measures and as a result reduce the total value losses of ecosystem services.
- **3** It can also quantify the amounts of compensation capitals that should be offered by project owners.

3.4 Building ecological compensation mechanism

- **In the field of environment protection, the principle of “who pollute, who pay”, has gotten widespread approval of international societies.**
- **Refer to this principle, it is suggested to clarify the principle of “who damage, who pay” in dam construction policies that the dam owner is the main body responsible for ecological compensations.**

3.4 Building ecological compensation mechanism

- **The compensation standard** shouldn't only protect endangered and rare animals and plants or restore the vegetation in reservoir area. It should base on the total value loss of river ecosystem services. ,
- **The compensation scope** should not limit to reservoir and its downstream areas. It should be extended to the whole river basin.
- **The compensation period** should be accord with dam`s life span.

3.4 Building ecological compensation mechanism

- **The compensation mode should also include law establishment in order to implement reservoir operation modes in favor of river biology growth and multiplication. The induced power loss can also be taken as a kind of compensation mode.**

Thanks!