

ANALYSIS ON SOCIAL IMPACT IN WATER CONSERVANCY AND HYDROPOWER DEVELOPMENT

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Abstract: stakeholders in water conservancy and hydropower development were analyzed and divided into four category with beneficial groups, groups whose benefit may possibly be affected, operators of water conservancy and hydropower projects, other stakeholders. Then six characteristics of stakeholders were analyzed and the reasons to analyze the social impacts of different stakeholders were expatiated. Based on the possible long-term positive effects, long-term negative effects, short-term positive effects and short-term negative effects, the framework of how to analyze social impact were established and four suggestions were put forward in water conservancy and hydropower development: establish social assessment system, establish participation and consultation system, establish publicity system and establish reasonable compensation and participation of interests system.

Keywords water conservancy and hydropower projects development, stakeholders, social impact analysis, participation and consultation, information disclosure ,social assessment

1 Stakeholders Analysis In Water Conservancy And Hydropower Development

1.1 Stakeholders

Interest group refers to those who have the same status (position) or common interest from the social aspect, economic aspect, cultural aspect, etc. And the stakeholders in water conservancy and hydropower development are groups or parties who have direct or indirect relation with the development in the period of project preparation, project construction and project operation. Stakeholders are as follows:

(1) Beneficial groups

Directly beneficial groups in operation period of the project after the construction. Such as, electric power consumers in electricity-transmitting areas, water consumers and irrigation farmers in water-supplying areas, residents and enterprises in urban area and rural area of flood control areas.

Beneficial groups who provide the building institutes or builders with direct or indirect services. Such as, institutes or individuals who provide project services in planning, designing, measuring, geology, implementing, supervising, monitoring, evaluating and consulting; institutes or individuals who provide services of materials, equipments, transportation, labors, technology and logistics in project construction.

Beneficial institutes and groups whose local infrastructure construction and social development are promoted by the increase of economic activities, revenue, financial revenue and employment opportunity due to project construction.

Beneficial groups whose condition and environment are improved by land acquisition and resettlement in habitation, transportation, water-drinking, electricity supply, commerce, livelihood and production.

(2) Groups whose benefit may be possibly impacted

Resettlers impacted by land acquisition and reservoir inundation in construction area; resettlers impacted by land acquisition, house demolition and temporary land occupation; households, villages and villagers impacted by land acquisition in relocate site.

Groups which may be impacted by the construction and operation of the project around the reservoir. Such as, groups whose opportunity of halieutics and mining are deprived due to the reservoir construction and water level increasing; institutes and individuals impacted by filling up of mud and sand in upriver branch, reverse flowing of river, increasing frequent of flood, damaging or invalidation of infrastructure (docks, water gate, water-drawing establishment, etc.) due to water level

increasing and impacted by damage of land or establishment due to collapse and coast; areas, institutes and individuals impacted by inundated property and infrastructure due to reservoir operation at abnormal water level; institutes and individuals impacted by the damage of former transportation system, or impacted by the increasing mileage, time and fee after restoration of the system; institutes and individuals whose productive cost is increased or benefit is decreased due to the inundated damage of socio-economic system in former cities, towns and villages.

Groups which are impacted by development of resources in lower reaches of the reservoir. Such as, enterprises and users whose irrigation, water-supply, transportation, electricity generation and flood control depended on the former amount of water and waterpower; institutes and individuals impacted by the damage or invalidation of infrastructure (docks, water gate, water-drawing establishment, etc.), the filling up of mud and sand and reverse flowing of river due to the hydropower development in upriver.

Groups which are impacted by the implementation of the project in environment, soil erosion, disease, sanitation and land damage. Such as, damage of irrigation, drainage and flood control system; damage land due to abandoned earth, soil erosion, coast, collapse and flood lash; air pollution and water pollution due to implementation in project area; loss of drinking water, crazing or collapsing of houses due to project construction; increasing of infectious disease due to large amount of builders get into the project area; groups whose activities are impacted by building of the project including going to school, hospitalizing, producing and commercing.

(3) Operators of water conservancy hydropower projects

Including developer, investor and manager. Developer and investor of water conservancy hydropower projects have direct economic relation with the project due to the capital and labor they devote into. While manager has relation with the project by the employment opportunity, labour reward and allocation during the operation of the project.

(4) Other stakeholders

As managers of the society, National government, local governments and relative sectors—land, urban house demolition, environment protection, water conservancy, forestry, power supply, telecom and transportation are responsible for economic growth, social equity and environment protection. On one hand, they should checkup, evaluate, supervise and regulate the activities of the developer of the water conservancy and hydropower project; on the other hand, they also should provide the developer with land, help to relocate the resettlers and coordinate the relationships, sometimes they are also one of the investors and have complex economic relation with the project.

NGOs and masses groups (Women's Federation and labour union). They are to help vulnerable groups and supervise the activities of the developer.

Social impact analysis pays particular attention to directly impacted groups (such as reservoir resettlers) and vulnerable groups in project area due to they are easily impacted or are difficult of benefiting.

1.2 Characteristic analysis of stakeholders (1) The advantageous and disadvantageous degree differs from stakeholder to stakeholder

In the water conservancy and hydropower development, different stakeholders has different opportunities in benefiting from the project. As for beneficial groups, they also have different benefit degree; as for impacted groups, they also have different impact degree. The cost or use differs even with the same degree of damage or benefit. Generally, impacted vulnerable groups such as reservoir resettlers and poor peasants are often ignored due to they don't have efficient prolocutor.

(2) Impacted period differs from stakeholder to stakeholder

Water conservancy and hydropower development impacts stakeholders in different period and the impact also has short-term and long-term. For example, land acquisition may impact reservoir resettlers for several generations, while house demolition may be temporary impact if being compensated reasonably and even be advantageous from long run. The construction of water conservancy and hydropower development can increase employment opportunity and financial revenue temporarily, while its function of generating power, controlling flood and supplying water is long range.

(3) The beneficial may not be damaged, while the victim may not be benefitted

The implementation of hydropower development is to make most people benefit from the project, while it still make a few of people sacrifice individual benefit. Beneficial group (such as electricity users) not always contribute to the project directly. The victims not always benefit from the project, at least not directly, though they have contributed to the project. For example, water users and beneficial group in flood control of downriver, electricity users in electricity-input area are beneficial groups in reservoir construction, but their interest isn't impacted by the construction of the reservoir. Reservoir resettlers are the victims, but they not always benefit from the reservoir construction or at least not benefit directly.

(4) Macroscopical benefit doesn't mean everyone can benefit from the project, while microcosmic victim doesn't mean everyone is victim

Hydropower development can increase local financial revenue and employment opportunity, can improve the basic condition of the regional socio-economic development. But not all of the householders in this area can benefit from the project, some groups' (especially resettlers) interest may also be damaged by the project. reservoir resettlers before 1990s' in China have made great contribution to hydropower projects, but many of them also obtain the opportunity to develop and not all the resettlers are victims.

(5) Different stakeholders may be intersectant

For one interest group, some of their interests may be damaged with benefit from the project at the same time. For instance, residents in dam area are impacted by the noise of the engineering, land acquisition and house demolition; while they also enjoy the opportunity of short-term employment, earning money and potential long-term development due to the construction of the engineering. Some people are both the beneficial and the victims: reservoir resettlers who must remove out of the former village and leave their familiar environment can be regarded as the victims of the project; while they will have more develop opportunities after being removed to developed area and can be regarded as the beneficial of the project.

(6) Understanding differs from stakeholder to stakeholder

Due to the different self-conditions, the request and expectation of different stakeholders in hydropower development are also different. And they also have different understanding and acceptance on impacts, which leads to different opinion and different attitude.

1.3 The Reasons to Analyze The Social Impacts Of Different Stakeholders

(1) Water conservancy and hydropower development should realize the multi-objectives of social equity, economic growth and environment protection and realize multi-benefit to all stakeholders. The damage and benefit in water conservancy and hydropower development differ from stakeholder to stakeholder, so it should analyze the stakeholders on potential social cost, economic cost, environmental cost and the payer before laying down reasonable policy, stratagem and measurement, planning development scheme to ensure multi-benefit to all stakeholders.

(2) Decided by the national socio-economic development objective. The ultimate objective of water conservancy and hydropower development is to promote economic growth and social equity, reduce poverty, promote environment protection and realize sustainable development of national and regional economy. So it should compensate the directly impacted groups due to reasonable compensation policy and system, at the same time it should improve the development of the vulnerable groups to the greatest extent to realize the objective of social equity.

(3) Abundant experience and lessons in water conservancy and hydropower development. 86 thousand of reservoirs built before 1986 have produced large economic and social interests, but they also bring lots of reservoir resettlers' remaining problems, produce millions of induced poor resettlers and many social problems, ecological problems and environmental problems.

2 Social Impact Analysis Framework

2.1 Possible Long-Term Positive Effects

(1) Meet the demand of electricity, drinking water and industrial water consumption requested by economic growth

Economic growth can develop regional economy, sufficient social welfare and security, more employment opportunity and much higher income to promote the social development.

(2) Meet the basic demand of electricity, clean water, flood control security and convenient transportation requested by the public

Based on the better basic conditions of subsistence and development, to improve the public's living conditions and living level, then to realize the easy objective.

(3) Meet the economic objectives of searching for new revenue source and increasing financial revenue requested by national and local governments

With powerful government finance ability, the public financial expense on social operation, infrastructure construction, social security and national security can also be increased and the government are more able to invest in elementary education, basic medical treatment, poverty reduction, women development, nationality development and social security to realize the objectives of socio-economic development.

(4) Meet the demand of water requested by agricultural irrigation, farmers income-increasing and rural development, so as to promote the industrial structure adjustment for agriculture, to promote the development of rural economy and to reduce poverty

One of the important factors leading to poverty is shortage of water resource. The shortage of water resource can lead to poor land productivity, low production level and low income level, and can also lead to drinking water shortage and poor life quality. Water conservancy and hydropower development can promote agro-irrigation works, improve rural electricity supply, increase land productivity and farmer income, develop non-agricultural industry, reduce and eliminate poverty.

(5) Promote the development of tour industry

Hydropower engineering and reservoir can increase man-made sight and natural sight, which are helpful in developing tour industry, bringing opportunity in increasing income and employment, and satisfying the demand on mental culture.

(6) Promote regional economy harmonious development and social equity

New engineering usually lies in middle area or western area, investment can also promote the regional economy growth. This can speed up the economic growth to shorten the socio-economic gap among eastern area, middle area and western area to promote the social equity.

(7) Offer cities and towns of reservoir areas with development opportunity

The reconstruction of the cities and towns in reservoir area can obtain the opportunity to change their visage and develop quickly. Reconstruction can improve infrastructure conditions such as water supply, electricity power, transportation, communication, education, environment and sanitation. It also can improve investment environments so as to obtain the opportunity in sustainable socio-economic development.

2.2 Possible long-term negative effects

(1) Induced impoverishment of resettlers

The construction of water conservancy and hydropower engineering usually need building reservoir and occupying lots of land, which may cause many involuntary resettlement. These resettlers will lose their labour subject, their houses, woods and families. If they are not treated reasonably, it may lead to induced poverty and deteriorate the plant conditions, the living conditions and economic conditions of the resettlers'.

It tends to arise induced poverty among resettlers that are relocated in former site. Land acquisition makes part of the farmers lose their land, and they will lead an impoverished life on condition that they cannot find steady employment opportunity. They are removed from rich and popular river valley to mountainous area with less and leanness cultivated land, which brings difficulty in production and leads to not enough food and clothing if without sufficient land resource. House acreage may decrease because compensations are not enough. Living condition may be improved through building house on the saving or loan, but this will decrease the input of family production and operation, which may decrease the income and lead to vicious circle in family economy. There also have more difficulty than before in drinking water, transporting, hospitalizing and educating. And the householder with poor,

women, minority and old may be impacted more greatly. Some of the short-term negative impacts may turn into long-term negative impacts if they are not resolved efficiently.

As for resettlers who are removed out of the former site, it tends to arise comparative poverty. Remove from native land to an alien land may destroy former environment, which produce more psychological stress on them, and it still need a long period for them to adjust their psychology and reconstruction their houses. Though the resettlers' life may be restored and improved with policy support and effort of their own, there is still a large gap between local residents.

(2) Impoverishment around the reservoir area

At present, the inundated loss and resettlement compensation is calculated on the basis of tangible assets (including all kinds of land, house, tree, establishment, etc.) and tangible physical deterioration (remove, transport, etc.) during remove and reconstruction, but the opportunity cost (marginal income brought by utilization of land, forestry, mine, tour resource, cultural property, etc.), all intangible loss (such as, loss of labour force capital, loss of cultural skill and rolling capital, loss of historical cultural legacy, loss of social capital, loss of social network, cost of social disservice and conflicts, etc.), the cost on relocation payed by local government and local community (including all kinds of labour consumption, financial consumption, resource consumption, time cost, loss of development opportunity, etc.), long-term living cost on reservoir construction payed by resettlers (the added transportation cost caused by longer road and bypassing, long-term operation cost of dock, ferry, bridge, defend engineering and drinking water engineering) are not taken into account. At the same time, with the exceeding flood save or the operation of reservoir after the reservoir construction, it still may arise the loss of land, establishment and property around reservoir area (these loss are often compensated unreasonably in the form of providing disaster relief under administrative order).

Imperfectly reasonable inundated loss and resettlement compensation and exclusion from the engineering costing increase the social cost, burden local finance, block local economy or decrease growth rate, sharpen social contradiction, decrease income or growth rate, which will lead to impoverishment around the reservoir area and expand the gap between reservoir area and non-reservoir area.

(3) Expand gap between urban and rural

That inundated by reservoir is often rural land and farmers cultivating on land, while the beneficial is often urban population. With the loss of land and productive material, farmers' interests are impacted, it may deteriorate their production conditions and living conditions if with no sufficient and reasonable compensation. As for urban area, its electricity, clean water and flood control security obtain guarantee and own better develop condition and opportunity, all of which may further expand the gap between urban and rural.

(4) Burden local finance

Local governments are responsible for the relocation, besides, they still want to pay other tangible and intangible cost. After relocation, they also should pay expense used to resolve remaining problem. At the same time, the natural condition of landform, relief, resource and environment changes greatly after the construction of reservoir, and the social framework also changes greatly after relocation, all of which make governments have to invest or expend more on transportation, water conservancy, agriculture development, urban communal facilities, environment protection and reservoir management. And with the decrease of land, mine and forest resource or with the limitation of resource utilization, the revenue source and financial revenue will decrease. Water conservancy project put the city, industry or ag-commerce on the first place, this will expand the gap between urban and rural, industry and agriculture, and further expand social inequality among stakeholders in these areas and industries and debase the standard of social equality. While the supporters think that these projects can support urbanization and industrialization, which can produce sufficient important surplus interest to help those poor rural population.

(5) Increase the conflicts between regions and groups

The layout and execution of policy, institution and mechanism of water conservancy and hydropower development may lead to unbalance of interests and social inequality among stakeholders, which also increase the conflicts between regions and groups.

Social conflicts between resettlers and non-resettlers. The rights and interests of resettlers often suffer unreasonable invasion in large-scale water conservancy and hydropower project; and their

production level, living level and living quality also suffer disadvantages. The resettlers are removed to new places, occupying lands of non-resettlers' and sharing public establishment and employment opportunity. As for non-resettlers in relocation site, their adjusted lands have been compensated, but not at market price, and they also suffer disadvantages.

Social conflicts between resettlers and developers. The rights and interests of resettlers' have been invaded and there will be a great contrast between the beneficial and evident inequity. Conflicts often arise between resettlers and developers of hydropower project, such as rational activities of appealing to the higher authorities for help and litigating, and irrational activities of hindering the construction or operation.

Social conflicts between resettlers (or residents in relocation site) and local government. When the loss of resettlers' or local residents' is beyond a certain extent, they may have conflicts with government in the forms of appealing to the higher authorities for help, sitting-in or litigating individually or collectively.

Social conflicts among different stakeholders between upriver and downriver, between left bank and right bank. Stakeholders in upriver and downriver, in left bank and right bank will have conflicts on the stand or fall of water resource access, on the right of water resource and on the allocation of the benefit. For example, the consumption of water in upriver area will be restricted because of the water consumption in downriver area or the consumption out of the drainage area, but there is not any compensation or return for upriver area. On the contrary, the comparatively poor areas in upriver cannot have sufficient investment during the water conservancy development due to the weak economic power, and the loss of resource development opportunity caused by reservoir inundation cannot be compensated, these all can arise conflicts between upriver and downriver during water resource development.

All these conflicts will have disadvantage on the construction and operation of the water conservancy and hydropower development project. how to eliminate and decrease the disadvantage is a problem need resolving.

2.3 Possible short-term positive effects Reservoir construction need much labour and service and local population can obtain employment opportunity directly to increase their income during the construction of the project.

The construction of the project also can promote the development of the service-type businesses, such as building materials, transportation, commerce, building industry, hostel and agricultural produce supply. And these also can provide many indirect employment opportunity.

Farmers and local residents can obtain employment directly or indirectly during the project construction through attending the project construction or providing services. After training or "learning when working", they can learn skills and buildup their management capacity.

Living environment and condition of part resettlers may be improved after remove, and the conditions of transportation, drinking water and electricity may also be improved.

2.4 Possible short-term negative effects

Inequable opportunity in employment, benefit and development may enlarge the gap between the poor and the rich, between the male and the female, between different minorities, between impacted areas and beneficial areas.

The inequality degree will be further enlarged due to different social position, social relation, resource possession, capital application, technical stuff, initial economic condition and ability in establishing a business.

The construction may destroy the former infrastructure such as irrigation, flood control, roads and drinking water. And other establishemtn such as school, health station and commerce may also be destroyed and the production and living of residents may also be impacted.

The quantity and category of the impacted assets is not exact, the compensation rate is not reasonable and the items are not comprehensive, all of these may make resettlers endure economic loss. Besides, unreasonable choice of relocation site may also make resettlers endure production damage, living damage and mental damage.

During the initial stages of the resettlers remove into a new place, the difference on language, culture, custom, land resource condition, life style and religion can lead to maladjustment and raise psychological problems, decrease employment opportunity and living level.

House demolition, house reconstruction and relocation need the participation of family member and mainly labour, this will decrease employment opportunity and living level.

3 Institution Arrangement And Mechanism

3.1 Establish and execute social assessment system as soon as possible

Based on the relative regulation on social assessment in Directory on Feasibility Study of Investment Project, State Development Reform Commission is suggested to organize and issue uniform Social Assessment Measure of Investment Project as soon as possible. Matched with Social Assessment Measure of Investment Project, Directory on Social Assessment of Investment Project also should be edited, so does the technology standards (Social Assessment Measure and Parameter of Investment Project, Socio-economic Survey, Social Monitoring and Evaluation Measure, etc.). All of these will cover every tache of invest project, namely socio-economic survey, project evaluation, implementation, management, supervision and consultation. Competent department of water conservancy and hydropower should also issue relative national standard—Social Assessment Measure of Water Conservancy Investment Project and Social Assessment Standard of Water Conservancy Investment Project. based on the policy and regulation, uniform policy and regulation system on social assessment in water conservancy and hydropower development can be formed, and the activities of social assessment, monitoring and evaluation, implementation and management can be regulated. The project budget must include the fee on social assessment.

Carry out the industry admittance and relative institute challenge in social assessment and strengthen institute competence management. Establish industry competence authentication system and put it into action. Besides, staffs should mount guard with certification (certificate to practise) and should receive train before mounting guard.

Carry out social monitoring and evaluation system, and the activity should be carried out by independent institute. The project budget must include the fee on monitoring and evaluation.

Strengthen institute capacity building. Establish and improve social assessment competent department of water conservancy and hydropower development project; strengthen cadre training, training base construction and teachers capacity building. Government should support relative university to establish specialty of project social assessment, and to foster undergraduate student and graduate student, which can provide regular and high-level professional to social assessment industry. Strengthen the study on social policy and social analysis. Strengthen the building of media, training textbook and information net of social assessment industry.

3.2 Establish participation and consultation system for stakeholders

All parties, including relative departments of central government, local government and competent department, developers of water conservancy hydropower projects, environment protection department, land administration department, resettlement department, representative of users, representative of resettlers, construction institute, design institute, monitoring institute, evaluation institute, research institute and relative groups, should participate equally in the project during every stage.

Establish the system that the compensation rate should be decided on the basis of consultation between developer and representative of the resttlers.

3.3 Establish information disclosure system

Water conservancy and hydropower development involves different public interest of redidents from upriver, downriver, left bank and right bank, so relative information should be open. If necessary, it should carry out hearing of witnesses to ensure public rights of knowing, participating and supervising. At the same time, independent monitoring and evaluation on social impact, economic impact and environmental impact should be carried out by external institute to track the project and measure prime index, which can improve the project implementation through feedback system.

3.4 Establish reasonable compensation and interests sharing system

As for reservoir resettlers, tangible and intangible inundated assets and relocation loss should calculate at principle of equal value interchange, and the compensation rate should increase sharply.

The loss of local financial revenue caused by water conservancy and hydropower development, benefit for resource use and increased expenditure of local government, the loss of benefit for resource use and all cost of village collectivity and farmer should all be calculated into project cost if they are not compensated reasonably. And should obtain cost recovery after the operation of the project and share the benefit. Establish compensation-deciding system of consultation between developers and representative of resettlers.

References

- [1] Shi guoqing and Chen shaojun (2001.12) *China Resettlement Policies and Practices*. Republic Printing House Ningxia.
- [2] Zhu wenlong and Shi guoqing (1995.2) Discussion on Participation of Water Conservancy and Hydropower Project Interest among Reservoir Resettlers. *Water Resource Economy*
- [3] Tang chuanli and Shi guoqing (2002.11) *Resettlement and Development*. Hohai University Printing House, Nanjing.
- [4] Gu maohua, etc.(1999.8) Disposal of Reservoir Resettler Remaining Problem—Planning, Management and Exploration. Hohai University Printing House
- [5] Asian Development Bank TA3441, Social Assessment Capacity Building, final report, 2002.5
- [6] Shi guoqing (1990) *Water Resource Technological Economics*. Teaching material of Hohai University
- [7] China Consultation Corporation of International Engineering (2002.2) *Directory on Feasibility Study of Investment Project*. Printing House of China Electricity