

VIETNAM'S HYDROPOWER POLICY REFORM

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ABSTRACT

For over two decades, Vietnam has rapidly built many hydropower plants around the Midlands of Northern Mountains, Central - Highlands and the Southeast of Vietnam. By 2010 the total installed capacity of hydropower projects across the country grew to over 9,200 MW, accounting for 44.66% of the total national electricity production. Although they represent a significant contribution to the national energy grid, hydropower projects are gradually revealing their negative consequences on the environment and society. The economic efficiency of electricity production is significantly reduced if you factor in the losses related to the loss of forests, decline of alluvium, shrinking of fish stocks, cause of seismism, and incidents such as flash flood release, change in river flow, volatility increase due to migration, resettlement and assurance of sustainable livelihoods for communities. Due to the reaction of the public, the press as well as critical opinions of scientists, civil society organizations and concerns of local authorities, the government of Vietnam has made some reforms related to hydropower policy, implementing several reviews and making a total assessment of hydropower development planning. In both 2012 and 2013, the government decided to cancel more than 400 hydropower projects across the country; a number of other hydropower projects were suspended or required to adjust in scale. Cascades of hydropower project already in operation were required to establish reservoir operating procedures in flood and dry seasons. The need for improved community consultation regarding hydropower operations and development policies discussed. The assessment of domestic hydropower risks also related to the concerns of hydropower dam construction plans on the mainstream of the Mekong River in upstream countries, whose transboundary impacts would severely impact the Mekong Delta, the largest and the most important agriculture and aquaculture production areas of Vietnam. With the policy reform changes that took place over hydropower development, investment programs for renewable energy sources such as wind power, solar power, and bio-electricity were promoted. Additionally, campaigns for power saving in daily activities and production activities were also encouraged.

This study focuses on reviewing the issues of hydropower development in Vietnam and the activities approaching policies to prevent concerning hydropower investment. It also records actual risks in the operation of constructed works, as well as summarizes policies and legal documents issued by the government of Vietnam in the last five years (2009 - 2014) relating to the planning and implementation of hydropower projects. The study makes reference to reports by scientists, civil society organizations, as well as press commentaries about the impacts of hydropower projects inside and outside the country. It also draws some practical lessons learned in Vietnam in canvassing the hydropower restriction policies. Those lessons are not only necessary for the investment decisions over hydropower projects in the future, but they also provide important lessons and examples for other countries to consider.

Keywords: Vietnam; policy reforms; dams; impacts and risks; socio-environmental issues; lessons.

1. PROBLEM STATEMENT AND RESEARCH METHOD

Viet Nam is a country with high annual rainfall and many river systems, including 2,360 rivers each more than 10km in length. The total length of rivers in Vietnam is up to 41, 900 km. Nation-wide is a system of 9 major rivers with more than 10,000 km² of catchment area. Excluding the Mekong Delta region, most river basins in Vietnam have steep slopes and high flow in flood season, so it is quite favorable for the development of hydropower. In the last three decades, Vietnam has continuously developed many hydropower plants of different sizes. Within three years, from 2002 to 2004, Vietnam built 17 large and medium-sized hydropower plants with a total installed capacity of 2,952 MW, and around 20 small-sized hydropower plants with a total capacity of 500 MW. According to the data of the Ministry of Industry and Trade (2011)¹, by 2010, the total capacity of installed power-plants was over 20,600 MW, increasing 3.2 times in comparison with 10 years ago, and 1.78 times more than in 2005. The amount of electricity production was estimated at more than 100 billion kWh, which was 3.7 times more than that in 2000, and 1.88 times more than that in 2005. In the total amount of electricity produced in Vietnam currently, hydropower has contributed about 9,200 MW, making up 44.66% of the national electricity production. By 2020, according to the planning VII scheme (Prime Minister, 2011)² hydropower output of Vietnam will have reached 17,400 MW. Particularly, with the medium and small-sized hydropower of national hydropower development planning, there will have been nearly 1,000 projects with the total capacity of 7,500 MW by 2020. There have been 340 hydropower projects put into operation or in construction process. In 2012, the amount of electricity provided by medium and small-sized hydropower plants occupied 19% of generated hydropower and 7% of total generated electricity of the whole system.

However, within the last five years, there have gradually arisen various problems related to the environment, economy and society resulting from the development and operation of hydropower dams. Evidence shows that hydropower projects have not always complied with their commitments or affirmation to minimize damage as written in their Environment Impact Assessment (EIA). Under the pressure of public opinion, especially the ideas and recommendations of scientists, local authorities, civil society organizations and the media , various angles of hydropower projects were reflected, analyzed, and evaluated. The result has led the authorities and the central government to reconsider hydropower development plans. To date there have been 400 hydropower projects across the country suspended, dismissed, adjusted in scale and forced to change their operation procedure.

This study reviews the reform of hydropower policies in Vietnam within the last five years (2009 - 2014), analyzes the relationship between the government and relevant stakeholders with the evidence of the adverse effects of hydropower to factors like environment, economy, and society. The study also evaluates the role of social organizations in mobilizing policies to reform the Vietnamese energy policy. Finally, this study presents lessons learnt from Vietnam and the applicability for neighboring countries in

¹ The Ministry of Industry and Trade (2011). *Evaluation report on strategy environment for the national electricity development Project 2011-2020, Considering to 2030 (QHD VII)*. Hanoi, p.262.

² The Prime Minister (2011). *Decision to Approve National electricity development planning for the period of 2011-2020, considering to 2030*. Decision no. 1208/QD-TTg issued on 21/7/2011.

addressing national strategies and energy development policies in their own country. The approach of this study bases on specific facts to review, analyze and evaluate.

2. CASE STUDIES

2.1. The cancellation of Dong Nai 6 and 6A hydropower projects

The hydropower project Dong Nai 6, one of the hydropower works in the Dong Nai River Basin, was approved by the Prime Minister³ in 2002 without an Environment Impact Assessment (EIA). The project has an installed capacity of 180 MW, and an average annual electricity output of 773.6 million kWh. The height of the largest dam is 98m, the total volume of the reservoir is 683 million m³, the area of the full reservoir is 1,954 ha, 732 ha of which belongs to Cat Tien National Park, and 1,222 ha to the protected forests of Dak Nong and Binh Phuoc province. 33 households (with 165 people) would have to be resettled, and 3 construction works needed to be moved (1 school, 1 health center, and 1 forest management center). In 2002, the Dong Nai 6 hydropower project was divided into two projects: Dong Nai 6 hydropower (DN6) with the capacity of 135 MW, and Dong Nai 6A (DN6A) with the capacity of 106 MW in order to minimize the inundated area and increase the capacity of generated electricity. In August 2009, as an investor, Duc Long Gia Lai corporation signed a contract with the Power Engineering Consulting Joint Stock Company 4 (PECC4) to set up an investment project; along with that it also signed with the Southern Water Resources Planning Institute and the Institute of Environment and Natural resources – Hochiminh National University - to carry out the EIA of this project.

Experts of Vietnam River Network (VRN) have reviewed this EIA report as well as organized various field trips to the estimated construction venue and the South Cat Tien National Park area to evaluate this project thoroughly (Le Anh Tuan, 2012)⁴. VRN found significant credibility problems of the report, and realized that the construction would threaten the South Cat Tien Natural Sanctuary. VRN quickly publicized those risks through seminars, meetings, and the media. A number of journalists, scientists, authorities, members of the National Assembly and other associations together with international organizations then participated to create open discussions. VRN issued press releases and request letters to the Government as well as the Ministry of Natural Resources and Environment to reject this project due to its negative effects to the environment, the society and its legal loophole. The authority of Dong Nai Province (2013)⁵ also seriously opposed this hydropower project to the National Assembly. On 30th August 2013, the Ministry of Natural Resources and Environment (MONRE) sent an official letter⁶ to the Prime Minister on evaluating the EIA of Dong Nai 6 and 6A hydropower projects. This letter

³ Prime Minister (2002). Official Letter No. 1483 of / CP-CN dated 19/11/2002 (in Vietnamese).

⁴ Le Anh Tuan (2012). EIA report on Dong Nai 6 and 6A hydroelectric projects (2012): *Ten concerns. Vietnam River Network, announced September 2012* (in Vietnamese).

⁵The People's Committee of Dong Nai province (2013). Petition to the National Assembly and the Government to stop the DN6 and DN6A hydropower projects. Document no. 5222/UBND-CNN issued on 03/7/2013 (in Vietnamese).

⁶ The MONRE (2013). The EIA report on Dong Nai 6 and Dong Nai 6A hydropower projects. Document no. 142/BC-BTNMT signed by Deputy Minister, Mr. Bui Cach Tuyen on 30-8-2013 (in Vietnamese).

was based on the surveys of the experts from the MONRE and the Committee of Science, Energy, and Environment of the National Assembly at the planned hydropower project venue at Dong Nai river basin. This official letter was notification of the EIA report to Dong Nai 6 and 6A hydropower projects compiled from June, 2012 by the project owner, Duc Long Gia Lai Company, and the Natural Resources and Environment Institute, and then submitted to the MONRE for appraisal. After that the project owner had to amend the report due to the number of its defects and deviations. They then withdrew the report for more amendments, however these amendments have still not been well made.

These were the key points and criticisms, as listed below, brought up by VRN experts and other social and environmental scientists. These specific concerns coupled with advocacy work and political pressure led the projects to be cancelled. The rejection of those hydropower projects DN6 and DN6A was nominated by environment journalists as the third out of ten outstanding environmental events in Vietnam in 2013⁷.

- This project will cause the permanent loss of 372,23 ha of forest, particularly, 128,37 ha of which belongs to the core area of Cat Tien National Park. The EIA report committed to replant the forest, but it did not mention the specific venue and the forest replacement planning.
- The project will result to the loss of biodiversity of Cat Tien National Park and the local ecosystem. The project has violated point 2, article 7 of the biodiversity law, which prohibits site construction in ecology restoration zone of conservation areas.
- The project will influence the downstream flow according to the socio-economic development, and also influence the environment for the habitat of aquatic ecosystem, especially in the river area behind the dam 6A and Bau Sau wetland area, which is recognized as the Ramsar of Vietnam. The project also lacks of hydrological information and appropriate operation plan of the consecutive reservoirs.
- The project will influence relevant heritages as per point 1, article 36 of the cultural heritage law, and it has not also been approved by the authorized organization.
- The project potentially has other negative impacts on supporting works, power transmission lines, and accessing roads. The construction of this project also creates invasion threat to Cat Tien National Park, impacts to the livelihood of people especially the ethnic peoples such as the Chau ro - Ma, Stieng, Mhong, etc. Concurrently, the project adversely affects the consideration process to recognize Cat Tien Nation Park as the world natural heritage.

2.2. The Song Tranh 2 hydropower project and the decision to suspend another 23 hydropower projects in Quang Nam

The Song Tranh 2 hydropower plant is run by the Electricity Corporation of Vietnam (EVN). This is the third among eight hydropower cascade plants that belongs to Thu Bon – Vu Gia river network. It started constructing in 2006 on a branch of Thu Bon river upstream area in Bac Tra My district, Quang Nam province. The Song Tranh 2 hydropower plant has an installed capacity of 190 MW, including two engine groups with the hope to produce the average annual electricity of 679,6 KWh. The reservoir capacity of Song Tranh 2 hydropower plant is of the largest in the Central with about 730 million m³ of water. The

⁷http://www.tinmoitruong.vn/home/print_detail/29807

project resulted in more than 1000 households being forced to move, with over 5000 people in total. It also caused over 2,448 ha of various kinds of lands to be submerged in the reservoir. The plant started to store water and generate electricity from December 2010. The dam became operational from the beginning of 2011 to supply electricity output to the national power grid. From the beginning of 2012, many cracks have appeared in the dam that leak a large amount of water to the dam's surface through its body. Scientists stated that the water leak through Song Tranh 2 hydropower dam was very dangerous because it exceeded 5 times the permitted level. From September 2012, a series of seismic phenomena have occurred in the area of Song Tranh 2 hydropower dam. Some hydropower experts explained that this was a stimulated seismism, a type of seismism due to the accumulation of reservoir water (Dang Dinh Cung, 2012)⁸. The quakes were caused by the operation of the Song Tranh 2 reservoir⁹, which enhanced the fault's intensity. The No. 1 Electricity Building Consultancy Company¹⁰, as a designer for Song Tranh 2 Project, has admitted their shortcoming in the survey, including deficiencies earthquake excitation, shock resistance strength assessment in the project area. At the time of publishing, there is no sign of the seismism ending. In the period of 2012 – 2013, the issues of Song Tranh 2 hydropower dam was the largest hydropower issue that caused unstable condition for local citizens. It was also one of the most controversial issues among scientists, authorities, civil society organizations and the local community. The issue has continuously appeared on all types of media in Vietnam, and become a typical example and warning in considering hydropower investment in Vietnam in the last three years.

On 22nd December 2013, the Chairman of the People's committee of Quang Nam province, Mr. Le Phuoc Thanh, requested to stop the investment and rejected 23 hydropower projects¹¹ out of the planning, including the following hydropower plants namely the Song Tranh 5, the Hiep Duc, the Ta Moih, the Ma Cooih, the Ha Ra, the Bong Mieu, the A Vuong 4, the A Vuong 5, the Nuoc Buou, the Nuoc Xa, the A Banh, the Đăk Pring, the Cha Val, the A Vuong 3, the Song Bung 3A, the Nuoc Bieu, the Đăk Di 1, the Đăk Di 2, the Đăk Di 4, the Nuoc Che, the Song Bung 3, the Tra Linh 2, the Đăk Pring 2 and the Tam Phuc. The cause was thought to be due to the adverse effects on local people, land, environmental disturbance, low investment efficiency, or not implemented according to schedule commitments. The Prime Minister's office requested 6 hydropower plants on Vu Gia – Thu Bon river system to establish the operation procedure of consecutive reservoirs, comprising of the A Vuong, the Đăk Mi 4, the Song Tranh 2, the Song Bung 2, the Song Bung 4 and the Đăk Mi 1, because their current operations were not in harmony together in preventing floods in the rainy seasons and providing water for irrigation and domestic utilities in the dry seasons to the downstream areas.

⁸ Dang Dinh Cung (2012). Seismism and Song Tranh 2 Hydropower Dam: an engineer's view (in Vietnamese). http://aejrsite.free.fr/goodmorning/gm138/gm138_DongDatVaDapThuyDienSongTranh.pdf.

⁹ <http://vietbao.vn/tp/Toan-canh-vu-dong-dat-rung-chuyen-thuy-dien-song-Tranh-2/3416870/>

¹⁰ <http://vnexpress.net/tin-tuc/thoi-su/nhieu-sai-sot-trong-danh-gia-tac-dong-cua-thuy-dien-song-tranh-2-2244339.html>

¹¹ <http://vnexpress.net/tin-tuc/thoi-su/quang-nam-loai-23-du-an-thuy-dien-2253680.html>

2.3. Incidents involving the construction and operation of hydropower in the Central and Central Highlands of Vietnam in recent years

The area of the Central and Central Highlands of Vietnam is narrow; its soil is poor; the terrain there is steep and easily eroded; it is often dissected by numerous tributaries. In the coastal areas of the Central, there are frequently storms, hot winds, drought, abnormal heavy rains, saltwater intrusion and coastal erosion. There is also a significant difference in the rainfall in the rainy season and the dry season (from 2-4 times), which leads to more floods in stormy season; the floodwater rises very fast with high speed and strong erosion. In contrast, in the dry season, there is not enough water; therefore, the annual threat in this region is drought. The Central and Central Highland regions have much potential to develop small and medium hydropower thanks to the significant difference in altitude, and the high flow of floods. However, it is also a threat for people, and the challenge in the operation of investors. The river basin of this area is considered to be the place with the highest density of hydropower projects nationwide. The hydropower projects evolved over time have contributed to an increase in energy in the nation and in the region, but it is also controversial. In late September 2009, Typhoon Ketsana was the most devastating tropical cyclone to hit Vietnam. The Central and Central Highlands provinces from Thua Thien – Hue to Binh Dinh and Kom Tum reported that at least 48 people died and 40 others were injured in severe flooding caused by the typhoon¹². During Typhoon Ketsana, the A Vuong Hydropower Plant¹³ released, without warning around 150 million cubic meters of water which resulted in the flooding of countless villages in Quang Nam province and destroyed residential lives and homes. The Binh Dien Hydropower Plant in Thua Thien – Hue province suspended operations when Typhoon Ketsana damaged its two turbine generators. After the typhoon, the Ministry of Agriculture and Rural Development inspected hydropower reservoirs in the Central Vietnam that have been criticized for worsening the impact of floods. Since this disaster, local people also consider hydropower as "water bombs" placed on their heads^{14, 15}, particularly in the past five years as more and more negative consequences have appeared, including environmental and social impacts on people's living in the Central and Central Highlands (see Table 1).

¹² <http://www.saigon-gpdaily.com.vn/National/2009/9/74698/>

¹³ <http://www.thanhniennews.com/commentaries/flood-victims-know-who-to-blame-23855.html>

¹⁴ <http://english.vietnamnet.vn/fms/environment/95445/most-of-rivers-are-cut-into-pieces-by-hydropower-dams.html>

¹⁵ <http://www.vnbusiness.com.vn/society/1410-1-2-stormsdepressions-hit-vietnam-in-september.html>

Table 1: Risk Groups based on the hydropower operation

No	Risk Groups	Effects	Typical Cases
1	<p>Operation risks in stormy season: floodwater is discharged unreasonably; there is no reservoir, or the capacity of reservoirs is not enough to store floodwater, causing serious flooding in areas downstream</p>	<p>Cause abnormally serious floods in areas downstream and damage for people; sweep crops and animals away; cause landslide at riverbanks; damage transport works, interrupt people’s living</p>	<ul style="list-style-type: none"> • A Vuong hydropower (Quang Nam) September 2009 • Ba Ha river hydropower (Phu Yen) October 2013 • An Khe – Kanat hydropower (Binh Dinh) May 2010
2	<p>Operation risks in dry season: due to the shifting of water flow to other currents, less water flows to downstream areas, which is under the minimum current flow requirement</p>	<p>Cause serious drought in downstream areas, and lack of water for living in the city; increase saltwater intrusion; lack water for irrigation, resulting in fields with incapability of cultivation or poor yield; increase pollution</p>	<ul style="list-style-type: none"> • Dak My 4 hydropower (Quang Nam) since 2012 • Ba Ha river hydropower (Phu Yen) 2013 • Vinh Son – Song Hinh hydropower • Komtum upstream hydropower
3	<p>Risks for hydropower works: dam bodies are cracked and leaked, even causing the dam to break, cause earthquakes and subsidence in surrounding areas</p>	<p>Panic residents, reduce the efficiency of power generation, and cause damage to surrounding works. Influence on people’s living and the security of the areas.</p>	<ul style="list-style-type: none"> • Song Tranh 2 hydropower (Quang Nam) since 2012 • DakMek 3 hydropower (Kom Tum): dam wall was broken in 2012 • La Krel 2 hydropower (Gia Lai): the dam is broke twice • DamBol hydropower (Lam Dong): pipelines were broken in June 2011

No	Risk Groups	Effects	Typical Cases
4	The reduction of riverine environment: water and alluvium stored in reservoirs, dam works preventing natural river currents, the construction of reservoirs causing the loss of forests	Reduce the amount of natural sand, reduce the alluvium to the areas downstream, extreme loss of forests, pollute water, affect the riverine habitats, and threaten wild animals...	<ul style="list-style-type: none"> In most river systems that have hydropower works as in Vu Gia – Thu Bon Rivers Basin, Sesan – Sre Pok Rivers.
5	Social affairs: compensation, resettlement, social injustice	People forced to move to new places, unreasonable compensation, livelihood loss, degradation of customs and community activities etc.	<ul style="list-style-type: none"> In most areas where hydropower works are built. Some of the worst cases have been known as Dak My 4, Song Bung hydropower projects.

(Source: Le Anh Tuan, 2014)¹⁶

2.4. Cancellation or suspension of more than 400 hydropower projects of the Government of Vietnam

Implementing the Resolution 40/2012/QH13 of the National Assembly of Vietnam¹⁷ (2012), in collaboration with other ministries, branches and localities, the Ministry of Trade and Industry continued reviewing the overall planning of hydropower to report to the National Assembly in the 6th session (October-November/2013). The report specified which projects to be cancelled, which ones to be adjusted, which ones to be implemented. It also proposed and verified measures to ensure the absolute safety for hydropower works along with overseeing the reforestation planting program. In 2013, the Government of Vietnam issued a specific policy for the residents living in the resettlement areas of hydropower works. That policy, for both existing dams and planned dams, focused on solving the compensation problems and the resettlement of hydropower works including existent problems of the Hoa Binh and Son La hydropower projects. The policy aims to ensure that displaced people have better places of

¹⁶ Le Anh Tuan (2014). *Rivers in Coastal Central and Central Highlands of Vietnam: Hydropower Planning and their Environmental Problems*. Oral presented in the People's Forum "Hydropower in Coastal Central and Central Highlands – Concerns of People and Responsibilities of Relevant Parties", held by VRN and CSRD in Hue city, November 2014 (in Vietnamese).

¹⁷ The National Assembly of Vietnam (2012). *Resolution of questions and answers in Session 4, the National Assembly XIII*. Resolution 40/2012/QH13 approved by the National Assembly XIII in the 4th session, 23rd November 2012 (in Vietnamese).

settlement with opportunities to develop production and raise incomes. Actually, there was no measure of accountability to ensure that these changes were effective as expected.

According to the report of the Ministry of Environment and Natural Resources¹⁸ (2013), due to the poor quality of small and medium hydropower planning, low economic efficiency and potential adverse influence on the environment and society, the Government of Vietnam excluded from the national planning six cascade hydropower projects: Huong River Basin, Vu Gia – Thu Bon River Basin, Con River Basin, Ba River Basin, Sre Pok River Basin, Dong Nai River Basin, with the total capacity of 395 MW (including Dong Nai 6 and 6A hydropower projects), and 418 small hydropower projects (with the total capacity of 1,174.49 MW). At the same time, they stopped the consideration the planning of 172 potential hydropower locations (with the total capacity of 375.65 MW). The government also suspended another four medium hydropower cascade projects with the total capacity of 208 MW, and 132 small hydropower projects with the total capacity of 915.7 MW. They will only take them into reconsideration after the year 2015 if those projects assure the investment efficiency in construction.

After the removal of these hydropower projects, there remains 815 hydropower projects with the total installed capacity of 24,324.3 MW nationwide. Specifically, the number of hydropower plants operating generators is 268 projects with the total installed capacity of 14,240.5 MW. It is also expected that by the year 2017 there will have been 205 projects constructed within 1,239 planned projects to be carried out (with the total installed capacity of 6,198.8 MW). The projects and potential hydropower locations were taken out of planning for two main reasons: (i) low investment efficiency, there are no investors or very few investors interested in those projects; and (ii) their negative impacts on the environment and socio-economics. There was almost no protest by hydropower investors to these government's decisions to cancel projects. Other energy generations sources, such as wind and solar stations, even nuclear energy, may be developed for replacing the lost hydropower electricity.

2.5. Reviewing the hydropower development projects in 2014

Under the high pressures of public opinions, in the morning session of the National Assembly of Vietnam on 27th November 2013, 88.96% of representatives approved of the Government to implement the Resolution of "Strengthening the planning management, the construction investment, the operation and exploitation of hydropower works". The resolution stated as follow:

¹⁸ Ministry of Environment and Natural Resources (2013). *Implentation report on answering the questions of the National Assembly and the recommendations of the voters in the 5th session of XVII National Assembly*. Document no. 175/BC-BTNMT, issued on 21st September 2013 (in Vietnamese).

"The review shows that there are limitations in the planning management, the construction investment, the operation and exploitation of hydropower works. The planning quality and investment decisions on building hydropower works, especially small and medium works, have not fully met the objectives and requirements of safety, environmental protection, rational water resource use and socio-economic efficiency. The assessments of the strategic environment as well as the environmental impacts on planning, projects, small and medium hydropower works are not focused in a proper way. Therefore, the quality of those assessments is not high. At some hydropower works, the fact that the construction quality management, the operational safety assurance as well as the implementation of reservoir operational procedures and water regulation do not strictly follow the law results in negative impacts. The life of people living in the resettlement places still has many difficulties. Forests and forestland which function is converted to serve hydropower works are not well-managed. In some places, deforestation is done with larger scale than requirement; also, natural resources are exploited illegally. The reforestation area at hydropower works is very small. Besides that, the duty to pay for the forest environmental services has not been fully implemented in accordance with regulations."

"The government directs ministries, People's Committees of provinces and relevant cities under the central authority to carry out a number of major tasks. These tasks are to continue checking and assessing hydropower planning including the projects suspended in a duration and the projects in operation; also, to ensure rational water resource use and biodiversity conservation. Besides improving the quality of formulating, appraising, approving and managing planning implementation, they also have to suspend and cancel inefficient and insecure hydropower projects which have negative impacts on the flow regulation, the environment and people's lives. The implementation should be synchronous with the hydropower planning in the scope of overall energy sector planning".

The National Assembly¹⁹ (2013)

According to the resolution, in the year 2014 provinces had to have overall assessment on dams, irrigation and hydropower reservoirs in the country. Meanwhile, besides issuing operating procedures of reservoirs on river basins, project investors (State government or private companies involved) also had to allocate sufficient funds to repair and upgrade the dams and reservoirs that may cause insecurity. In 2014, all existing and planned hydropower projects had to be reviewed, adjusted by the Ministry of Industry and Trade and provincial authorities, and supplemented additional policies of compensation and resettlement support

¹⁹ The National Assembly (2013). *Resolution on the improvement of planning management, construction investment and hydropower work operation*. Resolution No. 62/2013/QH13, approved by the National Assembly on 27th November 2013, in Public Newspaper Vol. 1007, 1008, 30th December 2013 (in Vietnamese).

for hydropower projects and their official promulgation. In 2015, local authorities must ensure that sufficient land is provided and strictly conduct reforestation, particularly in the upstream river basins of hydropower works. They must complete the reforestation at hydropower works which are in operation. In the resolution, it is also required to improve river basin management, coordinate and monitor the implementation of reservoir operating procedures especially ladder reservoirs, ensure that the reservoir operation will not cause duplicate floods, and solve interdisciplinary problems relevant to different localities in using water resources.

Based on this resolution, the Ministry of Construction has requested the Ministry of Industry and Trade, the People's Committees of provinces and cities under central authority to direct professional management agencies conducting inspections, checking construction investments as well as quality and safety management in the construction of small and medium hydropower works in their provinces. That must include examining, designing, constructing, checking and taking over the works. Those tasks must be performed and reported to the Ministry of Construction before 15th February 2015.

2.6. Concerns of the impacts of hydropower dams on the Mekong main stream across borders and the implementation of Mekong Delta Study (MDS) of the National Mekong Committee of Vietnam

On the mainstream of the Mekong River, the governments of Laos and Cambodia are planning to develop 11 hydropower dams (including 9 projects in Laos and 2 projects in Cambodia). Furthermore, an additional chain of 8 hydropower projects have been planned or built on the Upper Mekong basin in Yunnan, China. Those hydropower dams will lead to potential negative impacts on the economy, the environment and society in the Mekong basin downstream, including a part of submerged areas of Cambodia and the entire Mekong Delta of Vietnam. According to the report on Strategic Environmental Assessment study (ICEM, 2010)²⁰ commissioned by the MRC, it was asked to defer the decision on the hydropower dam construction in the Mekong River within 10 years in order to assess the overall impacts of the chain on the mainstream in the lower basin, the Mekong delta of Vietnam and the delta of Cambodia. Since the government of Laos announced their plans to build Xayaburi hydropower dam in the North of Vientiane capital, concurrently with the preparation period for Don Sahong hydropower project in 2014, many scientists, politicians and journalists have warned of adverse impacts to downstream areas (Fortin²¹, 2012; VRN²², 2012; RCC et al.²³, 2014 ; Nguyen Tan

²⁰ ICEM (2010). *MRC Strategic Environmental Assessment (SEA) of hydropower on the Mekong main stream*, Hanoi - Viet Nam

²¹ Fortin, J. (2012). *A Dam Conundrum: Xayaburi Project Could Help Laos and Thailand, Hurt Cambodia and Vietnam*. International Business Times, 5th November 2012. Available on <http://www.ibtimes.com/dam-conundrum-xayaburi-project-could-help-laos-thailand-hurt-cambodia-vietnam-859904>

Dung²⁴, 2014). The Vietnamese Government²⁵ has supported the position of a 10 year moratorium on dam building in the Mekong (James Hookway²⁶, 2011).

Due to not fully understood over the significant uncertain impacts of mainstream dams on the Mekong Delta to sustain life and well being for more than 20 millions of people living in the Lower Mekong River Delta, the government of Vietnam has proposed a research project to assess the overall impacts of the chain of 11 hydropower dams on the main stream to the natural system, economy and society of the lower Mekong basin, restricted to the low and flooded areas of Cambodia and the Mekong Delta of Vietnam. This project is called the Mekong Delta Study (MDS) conducted by the Danish Hydraulic Institute (DHI) and HDR consulting company. The goal of MDS is to "examining the overall impacts of hydropower cascade on the main stream on the economy, nature and society in the flooded areas in Vietnam and Cambodia". The research would be conducted within 30 months, from June 2013, applying phase approach. The impact assessment will basically focus on the regions hydro-logically associated with the main stream of the Mekong River. It is expected that the final report of MDS will be released in December 2015. This report may be used as an official scientific option the Vietnamese government on the impacts of cascade of Mekong mainstream dams to the Lower Mekong River Delta in both Vietnam and Cambodia.

3. FACTORS RELATED TO HYDROPOWER DEVELOPMENT POLICY REFORM

There are many reasons explaining the consequences and impacts of the hydropower development. Typically, massive hydropower construction were carried out for over 10 years

²² VRN (2012). *Vietnam Rivers Network's viewpoint On "Mekong and Hydropower dams"* (in Vietnamese).. [http://vrn.org.vn/en/h/d/2012/08/427/Vietnam_Rivers_Network's_viewpoint_On_\"Mekong_and_Hydropower_dams\"_/index.html](http://vrn.org.vn/en/h/d/2012/08/427/Vietnam_Rivers_Network's_viewpoint_On_\)

²³ Representatives of Rivers Coalition in Cambodia (RC) and Tonlesap and Mekong communities (2014). *Open letter to four Prime Ministers for calling to halt construction of Don Sahong Dam and stop making any development on the Mekong Mainstream Dam*. <http://www.mrcmekong.org/assets/Other-Documents/stakeholder-submissions/Final-010414-Eng-Open-letter-to-the-4-govt-on-DSH.pdf>

²⁴ Nguyen Tan Dung (2014). *Prime Minister 's Speech at the 2nd Mekong River Commission Summit*, HoChiMinh City, April 5th, 2014. http://www.vietnamembassy-denmark.vn/vi/vnemb.kr/nr070521165843/nr070521170351/news_object_view?newsPath=/vnemb.vn/tin_hddn/ns140407155634

²⁵ <http://vnexpress.net/tin-tuc/khoa-hoc/viet-nam-de-nghi-hoan-xay-dap-xayaburi-10-nam-2193603.html>

²⁶ James Hookway (2011). Big Dam Project Delayed on Mekong. In *The Wall Street Journal*, December 9, 2011, BKK. <http://www.wsj.com/articles/SB10001424052970203501304577086012500372618>

while the examination, the design, the assessment on social and environmental impacts, as well as the approval were performed inefficiently, and even reluctantly sometimes. Some investors did not specialize in constructing and operating hydropower plants; or they did not give adequate investment, especially they overlooked social and environmental factors in which people were the most vulnerable. Many commitments in the assessment on the environmental impacts were executed improperly without any monitoring measures and sanctions. One such measure, the reforestation policy, was not fully implemented in most hydropower projects. Even in the last years, governmental officials have not have fulfilled their duties to examine the hydropower investors, due to their gaps in hydropower knowledge. The negative impacts of hydropower in Vietnam can be listed as followed:

- ***Causing the loss of many valuable rainforest areas:*** Rainforest areas play an important role in providing the valuable services provided by biological diversity as well as protecting landslides and river banks erosion. Actually the concern of destroying the tropical forests for building hydropower reservoirs should not be about losing wild trees and animals; mankind stands to lose much more as instability of climate and hydrological regimes. According to the statistics of the Ministry of Agriculture and Rural Development²⁷ (2012), in the period of 2006-2012, there were 160 hydropower projects being constructed and more than 19,792ha of the total forest area shifted (the actual figure might be even higher as it did not include the forest area loss due to the demand for resettlement land and production land) in 29 provinces and cities under the central authority. In reality, according to the report on the environmental impact assessment, the reforestation area for replacement in accordance with the commitments was just about 3.7% in comparison with the requirement. The area in which many hydropower projects caused the greatest loss of forestland was the Central Highlands with 50 hydropower projects, followed by the North Central region with 23 projects. The other five areas respectively were the Northwest, the South Central, the Northeast, the Southeast and the Southwest.

- ***Occupying natural land area, causing relocation and increasing poverty rate:*** Hydropower works often occupy a lot of natural land, including forestlands, wetlands and residential lands. Mr. Le Tri Tap²⁸, former chairman of the Quang Nam People's Committee, said that the hydropower projects built in Vu Gia - Thu Bon River Basin had eliminated forestlands, and worsened flooding and endangered lives. According to the data of the Ministry of

²⁷ The Ministry of Agriculture and Rural Development (2012). *Report on the shift of the forest use to hydropower construction from 2006 to 2012*. Report no. 3716/BC-BNN-TCLN, signed 30th October 2012 (in Vietnamese).

²⁸ <http://en.baomoi.com/Info/Dams-leave-farmers-landless-and-hungry/3/27916.epi>

Agriculture and Rural Development²⁹ (2013), counting 21 hydropower projects in 12 provinces there were about 75,000 households relocated. Another investigation of the Institute of Development Consultancy (CODE)³⁰ (2011) showed that the area occupied by hydropower and the number of residents relocated in some hydropower plants were significant (Table 2). Forced to move to resettlement areas, those people faced many difficulties in their living with instable livelihood resulting in their low income. Consequently, the average poverty rate in those resettlement areas was at a very high level, accounting for 36.6%, nearly four times higher than the average poverty rate of the whole country in 2012. Table 3 is the result of many poverty rate investigations of the Ministry of Agriculture and Rural Development (2013) in the hydropower resettlement areas of Hoa Binh, Son La, Dien Bien, Lai Chau, Tuyen Quang, Thanh Hoa, Nghe An, Quang Tri, Phu Yen, Kon Tum, Gia Lai and Dak Lak (Pan Nature, 2013)³¹.

Table 2: Occupied land area and resident relocation of some hydropower projects in Vietnam

Hydropower	Occupied land area (hectare)	Residents relocated (person)
Thac Ba	23,400	30,000
Hoa Binh	75,000	89,720
Son La	23,333	91,100
Huoi Quang	4,558	6,459
Ban Chat	8,186	15,738
Lai Chau	4,143	6,579
Tuyen Quang	8,000	23,630
Ban Ve	5,492	13,790
A Vuong	941	1,582
Song Tranh2	2,900	4,300
Yaly	6,450	24,610
Pleikrong	5,328	6,000

(CODE, 2010)

²⁹ The Ministry of Agriculture and Rural Development (2013). *Report on the results, existences and problems in compensation, support and resettlement in hydropower construction*. Report no. 1483/BC-BNN-KTHT, signed 6th May 2013 (in Vietnamese).

³⁰ CODE (2010). *Relocation, resettlement, living establishment, protection of environment and natural resources in hydropower works in Vietnam*. Hanoi (in Vietnamese).

³¹ Pan Nature (2013). *Results, existences and problems in compensation, support and hydropower resettlement*. In the Bulletin of Environment, Natural resources and Sustainable development Policies, Vol. 10, 2nd quarter 2013. (in Vietnamese).

Table 3: Percentage of resettled poor households

Hoa Binh hydropower	43.00 %
Ta Co hydropower (Son La)	100.00 %
Son La hydropower (Dien Bien)	38.90 %
Huoi Quang hydropower (Lai Chau)	34.80 %
Ban Chat hydropower (Lai Chau)	34.80 %
Tuyen Quang hydropower	21.30 %
Ban Ve hydropower (Nghe An)	89.60 %
Hua Na hydropower (Hua Na)	19.50 %
Khe Bo hydropower (Nghe An)	60.00 %
Dong Nai 3 hydropower	60.28%
Song Tranh 2 hydropower (Quang Nam)	7.96%
Buon Kuop hydropower (Dak Lak)	8.10 %
Buon Tua Srah hydropower (Dak Lak)	8.10 %
Srepok 3 hydropower (Dak Lak)	8.10 %
Krong Hnang hydropower (Dak Lak)	8.10 %

(Pan Nature, 2013)

• **Declining biodiversity and regional environment:** The impact of hydropower on the decline of biodiversity as well as the ecology and environment has been proved and warned by many scientific studies in the world and in the region (Don E. McAllister et al.³², 2001; Carew-Reidet et al.³³, 2010; Parineeta Dandekar³⁴, 2012). In Vietnam, this issue made heated discussions for the last 2 years from 2012 to 2013 on the media, especially in the press and the scientific forums in Vietnam when Dong Nai 6 hydropower project was carried out in the area close to the protected area of Nam Cat Tien National Park, which was recognized by the UNESCO as the Biosphere reserve of Vietnam, and threatened Bau Sau area, which was recognized as Ramsar Wetlands of Vietnam.

The scientists from Vietnam Rivers Network³⁵ (2013) have documented that the hydropower projects DN6 & DN6A have violated the International Convention on Biodiversity in 1992 that Vietnam signed to the date 16th November 1994, violated point 2, article 7 of the

³² Don E. McAllister, John F. Craid, Nick Davidson, Simon Delany & Mary Seddon (2001), *Biodiversity Impacts of Large Dams*. Background Paper No. 1. Prepared for IUCN / UNEP / WCD. 63 pages.

³³ Carew-Reid, Jeremy, Josh Kempinski and Alison Clausen (2010). *Biodiversity and Development of the Hydropower Sector: Lessons from the Vietnamese Experience – Volume I: Review of the Effects of Hydropower Development on Biodiversity in Vietnam*. ICEM – International Centre for Environmental Management, Prepared for the Critical Ecosystem Partnership Fund, Hanoi, Viet Nam. 63 pages.

³⁴ Parineeta Dandekar (2012). *Impacts of Dams on Biodiversity: Need for Urgent Collaborative Action*. Oral presentation on the Second Indian Biodiversity Congress, 9-12 December, 2012, IIS, Bengaluru, India.

³⁵ Vietnam Rivers Network (2013). *Comments and feedbacks on the Report of Environmental Impact Assessment of the Dong Nai 6 and 6A Hydropower Project*. Hanoi (in Vietnamese).

biodiversity law (the National Assembly, 2008), which prohibits any construction in ecological restoration zones of the reserve. This work has also violated point 1, article 9 of the forest protection and development law (2004), which defines the principles of the forest protection and development. Based on point 12, article 7 of the environmental protection Act (2006), which prohibits the acts "invading natural heritage and nature reserves", those hydropower projects will cause damage to the ecological system, the environment, the biodiversity of Cat Tien National Park and native ecosystems. Besides, the works have also violated the decree of the government³⁶ (2003) on the conservation and sustainable development of wetlands.

- ***Exposing many risks and threats to people's living security through the operation of hydropower in many years:*** there are many real lessons (Nguyen Thi Thu Huyen³⁷, 2013; Quach Thi Xuan³⁸, 2014; Le Anh Tuan et al.³⁹, 2014) related to site accidents, broken dams, earthquakes, deforestation, flooding, drought, erosion, and saltwater intrusion, etc. Those lessons show that the hydropower in Vietnam is unsafe. Residents and local authorities were complaining and submitting their request to the National Assembly, the government and other ministries and branches many times about these hydropower problems. This made practical elements which forced the central government to make changes in vision and strategies for hydropower development. In the period 2013 - 2014, the government of Vietnam required the ministries, companies and local authorities to continue checking and evaluating the safety of dams and reservoirs; also, to determine to suspend the works which had had problems or potential risks. The hydropower cascade works on river basin systems had to develop regulations of reservoir operation in the condition of both flood season and dry season. However, those reservoir operation processes has not been complete, so they need to be adjusted.

³⁶ The government (2003). *Decree on the conservation and sustainable development of wetlands*, Decree no. 109/2003/NĐ-CP, signed 23rd September 2003 (in Vietnamese).

³⁷ Nguyen Thi Huyen (2013). *Overall assessment on the impacts of the activities of hydropower plants in the Central – Central Highlands region on the environment - Proposal for environmental protection and management*, Scientific report summarizing mission I-197 of the Ministry of Trade and Industry, 12 pages (in Vietnamese).

³⁸ Quach Thi Xuan (2014). *Case study of DakMi4 hydropower plant - A lesson learned from a diversion dam, in program: Supporting the MRC in pro-poor sustainable hydropower development*, published by GIZ and Network for Sustainable Hydropower Development in the Mekong countries (NSHD-Mekong). 65 pages.

³⁹ Le Anh Tuan, Dao Trong Tu, Dang Ngoc Vinh, Pham Thi Dieu My, Lam Thi Thu Suu (2014), *The operation of floodwater discharge and water storage of the hydropower reservoir to the downstream Vu Gia – Thu Bon river systems: from simulation data to the reflection of people's reality*, Technical report, cooperation program of ICCO and VRN, 20 pages (in Vietnamese).

4. THE REQUIREMENT TO PERFORM CONSULTATION AND COMMUNITY SUPERVISION OF HYDROPOWER PROJECTS IN VIETNAM

From the past until now, in Vietnam the water from rivers has been the source of life, the source of livelihood, the inspiration of poetry particularly for each region, and especially the hundred year civilization of water of our country. It is commonly agreed by any dynasties or generations in Vietnam that rivers are the common property of the society and people.

Law on Water Resource of Vietnam was passed by the National Assembly (2012) and has become valid since January 01 2013. Especially, the Article 3, which stated “Principles of management, protection, exploitation and use of water resource, prevention and damage improvement caused by water” implied that all agencies, organizations and individuals can use and protect the water resources in accordance with the principles of benefits harmony and equality of rights and obligations. One of the state's policies is to create all legal conditions to effectuate democracy at the grassroots level. This issue is reflected in the promulgation of Ordinance no. 34, which effectuates democracy at the grassroots level of the Standing Committee of the National Assembly⁴⁰ (2007); Joint Resolution no. 09 of the Committee of the Vietnam Fatherland Front⁴¹ (2008); Decision No. 80 of the Prime Minister⁴² (2005) related to the mechanism of community supervision. According to the regulations, people are encouraged to monitor and evaluate the implementation of the provisions of the investment, investors, board of project management, contractors and units of project construction in the investment process.

However, over many years the information of hydropower development projects has been very limited, particularly to local communities; the poor groups in rural and mountainous areas, and ethnic minorities. By researching and talking to people and some local officials in the river basin areas where hydropower has been developed, they are facing some obstacles in implementing consultation and community supervision. Most people have little access to information, lack of feedback, counseling guidance of the process of construction and operation of hydropower. Sharing benefits given by the river was not fair to disadvantageous groups in the society. The current limitation in Vietnam is that there are no models of community supervision which have been constructed and regularly performed. The residents and local government are still confused. They do not understand the monitoring process, and lack the guidance documents of consultation and supervision.

The issue of community supervision in the areas affected by hydropower is as essential as a process of democratization that many legal basis and documents have established and recognized. The purpose of community supervision of water resources in general, and operating procedures of hydropower

⁴⁰ Standing Committee of the National Assembly (2007). *Ordinances implementing democracy at villages, wards*. Ordinance 34/2007/PL-UBTVQH11, issued on April 20 2007 (in Vietnamese).

⁴¹ Committee of the Vietnam Fatherland Front (2008). *Guidance of implementing Article 11, Article 14, Article 16, Article 22 and Article 26 in Ordinances implementing democracy at villages, wards*. Joint resolution 09/2008/NQLT-CP-UBTWMTTQVN, issued on April 17 2008 (in Vietnamese).

⁴² The Prime Minister (2005). *Regulations of community investment supervision*. Decision No 80/2005/QĐ-TTg, issued on April 18 2005 (in Vietnamese).

reservoirs in particular, is to provide clear information as evidence for people to raise their voice when their legal rights are abused and for the investors who must be held responsible, to limit, improve and compensate if necessary.

5. SOME OTHER FACTORS RELATED TO THE REFORM OF HYDROPOWER DEVELOPMENT POLICY IN VIETNAM

Besides the factors related to the risk from the operation of hydropower projects which affect the environment and the society, changing decisions of water resources planning and development such as canceling, suspending and changing the project scale, there are other reasons.

5.1. Perception change of the economic effects of hydropower development

Many people have traditionally thought that hydropower is the cheapest source of energy which can gain significant economic benefits. In particular, several research projects have shown that small and medium hydropower have high economic efficiency because they do not have high investment rates and can get quick profits (Nguyen Dang Oanh, 2009)⁴³. However, this study also admitted, "*despite that, the precise data confirming the potential for the whole country or each province has not been fully assessed yet.*" While hydropower may seem cheap for investors, this is not the case for society more broadly, nor the majority of people in Vietnam. Many articles of hydropower development have purposefully ignored or have perfunctorily considered expenses to surmount, mitigate environmental damages or compensate the loss of the society, so the real hydropower cost is not cheap (Dao Trong Tu et al.⁴⁴, 2013).

Mr. Dau Xuan Thuy – representative of Construction Power Consulting 2 Joint- stock Company, said "*in the previous time, hydropower investment was interesting, taking only 15-20 billion Vietnam Dongs to 1MW. However, due to many factors, currently if the compensation cost for resident resettlement is added, it will take about 40 billion to get 1MW*" (Hoang Tuyen⁴⁵, 2010). The Vietnam Agriculture newspaper⁴⁶ (2010) mentioned that "*according to biosphere experts, to generate 1MW of electricity, it requires to 'change' at least 10 to 30 hectares of forest*". According to the data of the Ministry of Agriculture and Rural Development, from 2006 to late 2012, the hydropower took nearly 20,000 hectares of forest, including more than 7.500ha of special-use forests and protected forests. The

⁴³ Nguyen Dang Oanh (2009). *Research and assessment of the potentials and solutions for effective exploitation of small hydropower with the capacity of 1-30MW*, Report on Science and Technology project at ministry level – 2009, Project code:l160, Energy Institute, the Ministry of Technology and Trade.

⁴⁴ Dao Trong Tu, Le Anh Tuan, Le Kim Thai, Tran Dinh Sinh, Lam Thi Thu Suu, Nguy Thi Khanh and Hoang Thanh Binh (2013). *Analysis of Environmental and Social Costs and Risks of Hydropower Dams, with a Case Study of Song Tranh 2 Hydropower Plant*. GreenID report submitted to UNDP, 66 pages. http://www.vn.undp.org/content/dam/vietnam/docs/Publications/Hydropower_Research_final%20Oct%202013.pdf

⁴⁵ <http://chuyentrang.tuoitre.vn/TTC/Index.aspx?ArticleID=377493&ChannelID=89>

⁴⁶ <http://nongnghiep.vn/1-mw-dien-danh-doi-30-ha-rung-post62396.html>

department of Environment and Natural Resources of Lam Dong provided more specific numbers: it required 16ha of forest loss to get 1MW of electricity from small and medium hydropower plants⁴⁷. According to the statistics of the report 'Hydropower development and the system of specialized used forests in Vietnam', there are currently 47/128 of special used forests which are influenced inside or outside by 119 small and large hydropower projects. Thus, the average of each national park and reservation area "suffers" 2.5 hydropower projects; and it will take 62.63 hectares of forest land and special used forests to get 1MW of power⁴⁸. The forest value is much bigger than what is being considered in hydropower project costs.

Deputy Minister of the Ministry of Environment and Natural Resources, Nguyen Cong Thanh⁴⁹, stated in Saigon Times (Hanh Lien, 2008): "*The popular issue emerged in planning and designing hydropower projects is not to concern integrated economic, social and environmental efficiency. These works usually focus on power generation efficiency and output profit, and do not include requirements for downstream flood protection as one of the main tasks of the project. In many hydropower projects, tasks for downstream flood protection are only seen as a combination task*". According to an interview of the reporter named Ngoc Lan⁵⁰ (2008) of Saigon Times, which cited the statement of Mr. Tran Viet Ngai - Chairman of the Vietnam Energy Association, giving his general idea that the biggest investor in hydropower in Vietnam, as Song Da Corporation, has limited themselves to only being involved in a fewer number of smaller hydropower projects and concluded "*To conclude I can say that the time for hydropower investment is out-of-date*".

5.2. Social unrest due to hydropower dam projects and relocation

Hydropower projects are not only environmentally inefficient, but also cause many urgent social impacts. The construction of hydropower dams in Vietnam has displaced 44,557 households, and about 200,000 people (Bui and Schreinemachers, 2011)⁵¹ and expropriated 133,930 hectares of land (Pham Huu Ty, 2013)⁵². There are many issues from the process of construction, the site clearance, compensation, resident movement and resettlement, even though the policy of the government the Principle of migration and resettlement of Son La Hydropower is to ensure that people can have better

⁴⁷ <http://m.doanhnhansaigon.vn/online/kinh-doanh/chuyen-lam-an/2013/04/1073282/thuy-dien-het-thoi-chan-nuoc-thu-tien/>

⁴⁸ Nguyen Thi Thu Huyen (2013). *Overall evaluation on Influences on the Environment from Activities of Hydropower Plants in the Central and Central Highlands area, Solutions to Environment Management and Protection*. Science Report of I-197 Task Summary of the Ministry of Industry and Trade. 12 pages (in Vietnamese).

⁴⁹ <http://www.thesaigontimes.vn/Home/diendan/ykien/4962/>

⁵⁰ <http://www.thesaigontimes.vn/4872/Da-het-thoi-dau-tu-thuy-dien.html>

⁵¹ Thi Minh Hang Bui & Pepijn Schreinemachers (2011). Resettling Farm Households in Northwestern Vietnam: Livelihood Change and Adaptation, *International Journal of Water Resources Development*, 27:4, 769-785, DOI: 10.1080/07900627.2011.593116.

⁵² Pham Huu Ty, A. C. M. Van Westen and Annelies Zoomers (2013). Compensation and Resettlement Policies after Compulsory Land Acquisition for Hydropower Development in Vietnam: Policy and Practice. *Land* 2013, 2, 678-704; doi:10.3390/land2040678

life than in the old places in terms of housing, infrastructure, public welfare, and especially the conditions of production which must ensure the sustainable development in the future,” according to Mr. Do Van Hoa - Deputy Head of Department of Cooperatives and Rural Development to Tuoitre Newspaper⁵³. In fact, the impacts of the resettlement process in Son La vary widely (Dao, 2010)⁵⁴, the migration and resettlement of more than 90,000 people has a lot of problems because many resettlement areas do not satisfy the livelihood conditions for the people; water, soil and production land are not appropriate for the size of a culture community of Northwest ethnic minorities. Similarly, when Dong Nai 3 hydropower filled up and operated power turbine generator 1, the lives of more than 5,000 people in Dak P'Lao village, Dak G'Long commune, Dak Nong have remained unstable after 8 months of resettlement⁵⁵.

When the hydropower dam is operated, due to the process of inappropriate water retention and discharge, it has caused the downstream to suffer sudden high floods. This differs from the rainy season prior to the hydropower operation, when river water leveled up with slower speed and flow rate. When the dam operates, water from storms and hydropower plants lead to floods with faster speed and flow rate. In the afternoon of October 21st 2013, answering questions in front of the National Assembly, the Prime Minister Nguyen Tan Dung⁵⁶ frankly admitted to the weaknesses of hydropower dams, such as causing flood with great damage to the downstream, creating significant unrest amongst people in these areas. As a result he has requested⁵⁷ that concerned agencies inspect all reservoirs and dams that are in operation across the country and suspend those with facilities that are found unsafe.

The hydropower plant in Vu Gia - Thu Bon river basin also created social unrest due to water source conflicts. The issue that Đak My 4 hydropower moved water from Vu Gia river to Thu Bon river causes Da Nang City and surrounding areas to suffer from droughts and salinity intrusion. Many farming areas have been abandoned. The People's Committee of Da Nang City warned that this was an environmental disaster causing social unrest and costing billions to be solved⁵⁸. The authorities of Quang Ngai province organized a meeting to evaluate and analyze the hydropower development in the province; also to consider and solve the urgent matters of those who were affected in the hydropower area. In the province there are 12 hydropower projects in which people from Son Ha mountainous district are strongly influenced by 8 hydropower projects. Particularly, they also cause major damages to the people's lives and production, including Son Tra 1, Nuoc Trong, Dakdrinh, Dakdrinh 2, Tra Khuc 1, Song Tang, Huy Mang and DakBa. The district Party Committee and the People's Committee of Son Ha has

⁵³ <http://tuoitre.vn/tin/chinh-tri-xa-hoi/20040608/thuy-dien-son-la-con-nhung-bat-on-can-thao-go/36213.html>

⁵⁴ Dao N. (2010). Dam development in Vietnam: The evolution of dam-induced resettlement policy. *Water Alternatives* 3(2): 324-340.

⁵⁵ <http://m.nongnghiep.vn/tdc-thuy-dien-dong-nai-3-bao-gio-den-hoi-ket-post76110.htm>

⁵⁶ <http://nld.com.vn/thoi-su-trong-nuoc/thu-tuong-thuy-dien-xa-lu-gay-hai-lam-dan-buc-xuc-20131121052526494.htm>

⁵⁷ <http://tuoitrenews.vn/society/15369/unsafe-hydropower-plants-must-be-shut-down-premier>

⁵⁸ <http://dwrn.gov.vn/index.php?language=vi&nv=news&op=Tai-nguyen-nuoc/Khong-vi-thuy-dien-ma-giet-song-Vu-Gia-658>

submitted many documents to Provincial Standing Committee and the People's Committee of Quang Ngai province to propose interrupting the investment approval and excluding from their planning, hydropower projects which cause huge damage to the environment and people's lives.⁵⁹

5.3. The roles of scientists, civil society organizations, the media, local authorities and the opposition weakness in hydropower policy reform

In the past 5 years, the role of social criticism from scientists, civil society organizations, the media and ideas from local authorities have been risen up by the public; and this is considered as a breath of fresh air in the process of democratization of the country by the government. A series of workshops, forums, seminars at the provincial, regional and national level have been organized to discuss the impacts of hydropower to the requirements of economic development, environmental protection and social stability. They have been held from the North to the South of the country. In those discussions, comments and perspectives of several sides were frankly acknowledged. Most relevant stakeholders to the hydropower operation were invited to participate including provincial leaders, ministries and hydropower investors, managers of water resources and environment, social organizations, representatives for the communities in hydropower areas. Most journalists were invited to attend, question, discuss and report to the public. In addition, some broadcasters have made several documentary films about the impacts of hydropower which have been shown on television channel systems throughout the country such as the VTV1, VTV3, VTV6, etc... Some international organizations like IUCN also made films and noted the urgent concerns from the community, related to hydropower. Those films were shown to many people such as students and lecturers at universities, and journalists⁶⁰. Many films about the negative impacts of hydropower on downstream areas have also been introduced in Vietnam; for example, the movie "Where have all the fish gone?" by the British filmmaker, Tom Fawthrop⁶¹. Some workshops have also invited senior officials from the Central Ministries and a number of delegates of the National Assembly. In these workshop forums, some governmental officials and hydropower investors who previously confirmed that hydropower brought great benefits had to admit the weaknesses of hydropower operation to the environment and community.

5.4. Evidences regarding to negative impacts or cancellation of hydropower projects in other countries reported by national presses

Along with forums for academic exchange, many national media outlets have released numerous articles about the hydropower issues in the region and in the world as case stories parallel to the hydropower problems inside Vietnam. The articles issued in printed newspapers, then published in online version and spread on the Internet very quickly, creating a viral effect to different groups. Some

⁵⁹ http://www.nhandan.com.vn/mobile/_mobile_phongsukysu/_mobile_kysu/item/25091702.html

⁶⁰ http://www.iucn.org/news_homepage/news_by_date/?18285/174/Cac-nha-bao-suy-ngh-gi-sau-khi-xem-hai-b-phin-Me-Kong

⁶¹ <http://citinews.net/khoa-hoc/nha-lam-phin-tom-fawthrop-canh-bao-rui-ro-cua-con-dap-don-sahong-IUSFU4I/>

typical cases can be cited as the decision of Myanmar⁶² to suspend the construction of Myitsone Dam invested by China. That is a current and practical example which is quite close to the condition of Vietnam. There are also some typical cases concerning the impact of hydropower on fish diversity. For example, Nam Song Dam (Laos)⁶³ completed in 1996, not long after that 40 fish species have disappeared, and 20 migratory species across national borders did not appear in the neighboring countries. In the case of Pak Mun hydropower dam in Thailand, 265 fish species were identified to exist on the stretch of this river, but after the dam was built, only 96 species remain, 51 species of which are reported to have decline in abundance. The collapse of Stung Atay Dam⁶⁴ in Pursat province, western Cambodia constructed by Tai Yang, a China's state owned enterprise, has resulted in the death of workers. The media have also reported protests against the dam construction on the mainstream of the Mekong River in Thailand⁶⁵, Cambodia⁶⁶ and Laos. They have also reported a number of cases in the world such as the decision of Brazil⁶⁷ to suspend the construction of Belo Monte Dam blocking the Xingu River (Para State), a tributary river flowing to the Amazon River. That construction caused 16,000 to 40,000 people to be moved from their homes. Meanwhile, California⁶⁸ (USA) also had to decommission its biggest dam in the history due to its negative impacts on the environment.

5.5. Vietnam starting to develop renewable energy sources and power-saving program

During the past 5 years, Vietnam has started to promote renewable energy development programs such as biogas, wind energy and solar energy programs as part of the climate change mitigation and adaptation solutions of the nation. Although the renewable energy projects are in small scale, they help reduce the pressure of power production needs in Vietnam. They also partly play a noticeable role in supplying national off-grid-based power.

Research by the Ministry of Industry and Trade⁶⁹ (2010), funded by the World Bank, showed that the potential of wind energy in Vietnam in the height of 80 m above the coastal land surface was above 2,400 MW (average wind speed was over 7 m/s per year). The Prime Minister⁷⁰ (2011) issued the

⁶² <http://www.warecod.org.vn/vn/thong-tin/tin-tuc-su-kien/43/232/Myanmar-dinh-chi-xay-dung-dap-thuy-dien-Myitsone.aspx>

⁶³ <http://vnexpress.net/tin-tuc/cong-dong/con-ca-hay-dap-thuy-dien-2156541.html>

⁶⁴ <http://tuoitre.vn/tin/the-gioi/20121203/vo-dap-thuy-dien-o-campuchia-4-nguoi-mat-tich/523237.html>

⁶⁵ <http://conganphuyen.vn/moi-trung/348-thai-lan-biu-tinh-phn-di-xay-dp-xayaburi.html>

⁶⁶ <http://motthegioi.vn/quoc-te/thi-su-quoc-te/dan-campuchia-bieu-tinh-phan-doi-lao-xay-dung-thuy-dien-102397.html>

⁶⁷ <http://www.thanhvien.com.vn/the-gioi/brazil-tam-hoan-thi-cong-dap-thuy-dien-khong-lo-belo-monte-49636.html>

⁶⁸ <http://tainguyenmoitruong.com.vn/tu-su-kien-my-pha-dap-thuy-dien-lon-nhat-trong-lich-su-ta-dang-di-nguoc-dong.html>

⁶⁹ Vietnam Ministry of Industry and Trade (2010). *Wind resource Atlas of Viet Nam*, Sponsored by World Bank, Prepared by AWS Truepower, 463 New Karner Road, Albany, New York 12205.

⁷⁰ The Prime Minister (2011). *Decision on mechanisms to support the development of wind power projects in Vietnam*, Decision no. 37/2011/QĐ-TTg, signed on 29th June 2011 (in Vietnamese).

decision on a policy mechanism to support the development of wind power projects in Vietnam, and approved the list of the project 'wind power development planning in Vietnam', funded by the official development sponsorship of the government of Germany (the Prime Minister⁷¹, 2014). The decision 1208/QĐ-TTg of the government (2011) approved the renewable energy development planning; in that Vietnam aimed to reach 1,000MW of wind power capacity by 2020 and reach 6,200 MW by 2030. Currently, there are about 48 wind-power projects registered in Vietnam (Phan Thanh Tung et al.⁷², 2012). One wind power project in Binh Thanh Commune (Tuy Phong district, Binh Thuan province) is to complete the construction of 20 wind turbines with an installed capacity of 30MW. It is expected to increase the total capacity of 120 MW in the next phase. The investor of the wind power project in Binh Thuan is Vietnam Renewable Energy JSC. In Bac Lieu province (Mekong delta), a wind power project under the investment of Cong Ly Commerce and Services limited company has installed 10 wind turbines of GE (USA)⁷³ with the capacity of 16 MW. It is expected that the wind power project in Bac Lieu will increase installed capacity to 120 MW in its second phase. Currently, Phu Cuong Group⁷⁴ (Hochiminh City) is promoting the investment of a wind-power field with the capacity of 170MW in Soc Trang province. The total investment for this project is 436 million US dollars. On 04th July 2014, the management board of Nhon Hoi economic zone (Binh Dinh)⁷⁵ granted the investment certificate to Vietracon investment and management limited company (Germany) in cooperation with Green Venture Invest AG (Switzerland), which have developed Nhon Hoi wind power plant project with the capacity of 30.55 MW. This plant will be operated in 2016, and will increase its total capacity of 61.1 MW in 2020.

Additionally, there is a plentiful source of sunlight in Vietnam almost all year round that can be exploited to meet the two main demands: thermal and electrical power. The average sunshine at 150 kcal/m² in Vietnam is between 2,000-5,000 hours per year. The year-round high solar radiation of 5.2 kWh/m² per day is a basic factor to develop solar electricity on an industrial scale for Viet Nam (Trinh Quang Dung⁷⁶, 2009). Currently, a lot of solar power equipment⁷⁷ has been installed in many places such as the building of the Ministry of Industry and Trade (capacity of 12KW), Bai Huong village, Cham islet, Quang Nam (capacity of 28KW), My Dinh National Conference Center (capacity of 154KW) etc... and most of the outpost islands of Vietnam in the East sea.

⁷¹ The Prime Minister (2014). *Decision on the list approval of the project 'Wind power development planning'* funded by the official development sponsorship of the government of Germany, Decision no. 1539/QĐ-TTg

⁷² Phan Thanh Tung, Vu Chi Mai & Angelika Wasi (2012). *Wind-power development situation and financial support capability for projects in Vietnam*, a research of wind-power project sponsored by GIZ, 25 pages

⁷³ <http://www.nangluonggio.com/tin-tuc/89-ge-energy-muon-dau-tu-vao-dien-gio-viet-nam.html>

⁷⁴ <http://www.thesaigontimes.vn/123722/Phu-Cuong-dau-tu-lam-dien-gio-o-Soc-Trang.html>

⁷⁵ <http://www.thesaigontimes.vn/117111/Binh-Dinh-cap-phep-du-an-nha-may-dien-gio-109-trieu-do-la-My.html>

⁷⁶ Trinh Quang Dung (2009). Photovoltaic Technology and Solar Energy Development in Viet Nam. Tech Monitor, Nov-Dec 2009, pp: 29-36. www.techmonitor.net/tm/images/6/.../09nov_dec_sf3.pdf

⁷⁷ <http://tietkiemnangluong.com/tin-tuc/175/cac-du-an-dien-mat-troi-o-viet-nam.html>

In addition, power saving projects and policies⁷⁸ are being implemented in most provinces and cities in Vietnam. For example, financial support is given in order to encourage people to use compass lights, LED lights, solar water heaters and solar cookers etc.

6. LESSONS FROM THE HYDROPOWER POLICY REFORM OF VIETNAM

Through this research, the evidence has shown that there have been many changes in policy related to hydropower development policy in Vietnam at least in the last 5 years. Electricity generated from hydropower in Viet Nam is not as cheap if its estimated environmental and social costs are included. Local people displaced by hydropower projects have largely, thus far, been disappointed with the compensation and resettlement schemes offered. This applies to costs for resettlement and livelihood recovery, compensation for forest loss and direct and indirect negative impacts on biodiversity caused by the projects, as well as for dam safety and risk mitigation. Before 2010, there had been many guidelines promoting and enabling the construction of hydropower plants on many river basins in the country. However, there was a lack of careful and complete assessment of their impacts on the society and environment. Operation monitoring was reluctantly carried out, which led to a number of negative consequences for the communities living in the affected areas. In the period 2011 - 2014, the government of Vietnam started to pay attention to the reflection and reaction of society toward problems caused by the lack of control over the process of hydropower development. Hydropower planning then was reviewed and reassessed. The government of Vietnam also determined to remove hydropower projects which were economically ineffective, and adversely affected the environment and society. The following lessons from the reality in Vietnam can be considered for other areas.

- The contribution to the process of policy reform cannot exclude the important role of policy advocacy from civil society organizations. Activist groups have known how to gather relevant stakeholders, organize conferences and forums, arrange field visits and meet local people to bring the voice of the community to the government.
- The collaboration with scientists from schools/institutes and social organizations help analyze events, give scientific evidences and practical lessons of countries about the risks of hydropower.
- The participation of journalists and mass media in the social and environmental policies has aroused the attention of the public and the government.
- Some governmental officials and delegates of the National Assembly have recognized real problems and proposed the government to review and reform the hydropower policies.
- The fact that the countries in the Mekong River upstream plan to build hydropower on the main stream with potentially negative impacts on the on the Mekong Delta downstream. Along with that,

⁷⁸ <http://tietkiemnangluong.com/danh-muc-tin/25/energy-savings.html>

the tendency toward changing perception and reassessing hydropower in the world has also played a part in the process of hydropower policy reform of the government of Vietnam.

- The development of science and technology helps conduct clean and renewable energy projects with a lower cost and higher efficiency. Also, many energy saving innovations and solutions have contributed to mitigate the dependence on traditional energy sources such as thermal power plants, hydropower and nuclear power that cause pollution and harmful effects on the environment and the society.

7. CONCLUSION

The rapid development of hydropower projects in Vietnam provides partly a positive contribution to the national energy scheme, but it also leads to many negative consequences due to the lack of adequate assessments and strict control of commitments required to reduce risks and damages for the environment and society, as in the reports of the environmental impact assessment. Hydropower has turned many parts of rivers into reservoirs causing the loss of constant factor of river flow and disrupting connections needed for the natural ecosystems and humanity. The risks of floods, drought, salinity intrusion, and water pollution from the chain of hydropower plants on river basins are likely to increase in the future if the extraordinary and unpredictable impacts of climate change are considered. Realities in recent years have demonstrated the inadequacies of planning, constructing and operating hydropower projects, which have adversely affected people's lives, livelihoods, and welfare. The hydropower works have led to the degradation of ecosystems, and obviously reduced the biological diversity in the region.

From the concerns of the public as well as the critical suggestions of scientists, civil society organizations, journalists and some local authorities, the government of Vietnam has recorded the concerns of the massive development of hydropower projects in the country. The government and National Assembly have reviewed hydropower development plans and policies. From that they have decided to cancel and suspend many hydropower projects which have no economic effect and rather cause negative effects on the environment as well as impact the majority of people across the country. At the same time, they also have made directives requesting hydropower plants to build safe operation plans in flood season and dry season in order to minimize damages to people in the area.

Although there are some adjustments in hydropower planning through the removal of small and medium hydropower projects, many issues of hydropower in Vietnam have not been resolved. Many hydropower projects, for example, have not yet implemented tree planting to cover the loss of forests due to the development of hydropower projects, as promised in the

Environmental Impact Assessments. In addition, the monitoring of environmental changes and ecosystem should be evaluated periodically. Some hydropower projects still face ongoing difficulties with resettlement, particularly in supporting sustainable livelihoods for people displaced by these projects. The fact that society organizations have contributed to reviews, consultations and community supervision for hydropower projects is seen as an expression and sign of progress for the democratic process as residents have participated in management of water resources, natural and environmental protection, biological diversity as well as forestry and wetland ecosystems.

The government of Vietnam is still experiencing difficulties in negotiating with other governments in the Mekong River upstream such as China, Laos, Thailand and Cambodia on the development of hydropower projects and their cross border impacts. The Mekong Delta region will face many potential risks if the chain of dams on the mainstream of the Mekong River is constructed.

The lessons related to canvassing the policies restricting hydropower construction and operation in Vietnam may be typical examples that can be shared with other countries. That hydropower is a clean and cheap energy has been widely disproven with much evidence and the true cost of hydropower is evident in the experiences faced in Vietnam. The future lies in the promoting the development of clean and renewable energy sources, and encouraging other energy saving initiatives and solutions in order to reduce global warming that leads to climate change.