

Analyzing Social Impacts of the integrated flood risk management approach for Ho Chi Minh City, Vietnam

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Abstract:: *Flooding in HCMC is considered as major priority needed to be solved due to the large concentrations of people and assets in urban areas and its direct impact on the city's economic growth. The Integrated flood risk management approach for HCMC, under support of the World Bank, is established to continually improve drainage systems, flood control and environmental sanitation for the City, where a focal point will be a catchment of Tham Luong—Ben Cat—Nuoc Len Canal. This study focus on the Social impact assesment when this project is proceed.*

Keywords: *Flooding, canal, social impact*

1. Introduction

Ho Chi Minh City (HCMC) is the economic center of Vietnam and accounts for a large proportion of Vietnam economy. Due to rapid population growth, inadequate and poorly functional infrastructure, low public awareness [1]. HCMC is challenged with environmental pollution, the causes of which include direct discharge of untreated wastewater to canals, creeks and rivers. In recent years, HCMC has been significantly flooded [2]. Flooding in HCMC is caused by high intensity of rainfall, flood-tide, poor effectiveness of wastewater drainage system in the areas, inefficient operation of reservoirs and land subsidence due to groundwater withdraw. Wastewater and storm water drainage systems of HCMC have been downgraded and overloaded during heavy rainfall events while those systems have still not been constructed in many places in HCMC. HCMC is also challenged with the inflow of the East Sea to the canal system. This inflow causes an increase of water levels in canals and obstructs its flow from the City center to Sai Gon River, especially during high tides. flooding in HCMC is caused by draining water from hydropower and irrigation reservoirs located in the upstream. HCMC, in 2000, was severely flooded due to draining water of Tri An reservoir (2,000 m³/s) and

Dau Tieng Reservoir (600 m³/s). Furthermore, HCMC is affected by flooding in Mekong River through Vam Co Dong and Vam Co Tay Rivers. HCMC's sewer systems have been developed locally and untreated wastewater has been discharged into rivers, creeks and canals causing severe pollution that damages water quality.

Flooding in HCMC is considered as major priority needed to be solved due to the large concentrations of people and assets in urban areas and its direct impact on the city's economic growth. Integrated flood risk management approach for HCMC, under support of the World Bank, is established to continually improve drainage systems, flood control and environmental sanitation for the City, where a focal point will be a catchment of Tham Luong—Ben Cat—Nuoc Len Canal.

2. Project description and research methods

2.1. Project description

Tham Luong – Ben Cat – Nuoc Len canal system is located in central of Ho Chi Minh City (North East – South West), which flow into Sai Gon river and Cho Dem river. Project area: 14,899 hectares (accounting of 7% of city natural area). The proposed project has construction works which are located in nine (09) districts of HCMC such as Binh Thanh District, Go Vap District, District 12, Tan Binh District, Tan Phu District, Binh Tan District, District 8, Binh Chanh District and Nha Be District. The Master Plan of the HCMC Flood Risk Management Project is shown in Figure 1

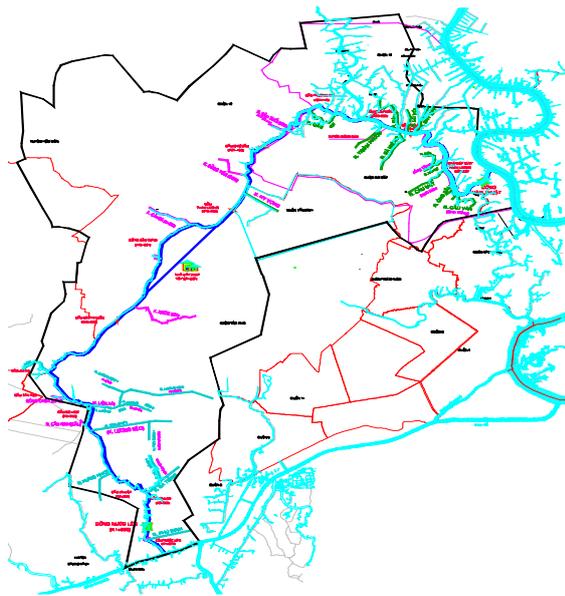


Figure 1 Master plan of HCM City Integrated Flood Risk Management Project

The project, “Ho Chi Minh City Flood risk management”, has three (03) components, each with Sub-components which are summarized below:

Component 1 - Integrated Urban Flood Risk Management

This component will contribute to reducing flood risk by strengthening the capacity of the HCMC Steering Center of the Urban Flood Control Program (SCFC) and other public institutions to better plan and implement flood risk management measures (including disaster preparedness through flood forecasting, early warning, flood emergency response, and risk reduction through risk sensitive spatial and sector planning), as well as safeguard the water quality and the health of the people living along the proposed canals.

Component 2 - Priority Flood Risk Reduction Interventions

This component will contribute to reducing flood risks and improving drainage in the Tham Luong–Ben Cat Sub-catchment through significant prioritized no-regret structural measures proposed in the JICA Plan (Plan 752) and MARD Plan (Plan 1547). Counterpart funding will be used to finance land-acquisition and resettlement, while the loan proceeds will finance the design, implementation, contingency and construction supervision costs.

Component 3 - Implementation Support

This component will provide support to SCFC for project implementation including staffing of the Project Management Unit (PMU), Project Technical and Financial Audits, Monitoring and Evaluation (M&E), and other operating costs. Training to the City’s PMU on procurement, financial management and safeguard policies will be provided by the World Bank in combination with other World Bank-funded projects’ training program.

2.2. Research methods

The study was based on existing statistical data on meteorology, hydrology, and socioeconomic conditions in the project area. Additional environmental data on air, noise, and water quality and social information were sampled from the project area and analyzed. Technical manuals on process engineering, pollution control technologies (including wastewater, air emission, and solid waste) and environmental rapid assessment manuals were used in the analysis. Pollution factors estimated by the World Health Organization (WHO) and other popular methods were also used.

The project triggers the World Bank safeguard policy on Environmental Assessment (OP/BP 4.01) [3] and is classified as Category A project due to significant impacts associated with the proposed investments/activities under Components 1 and 2. In addition, the project also triggers the following: OP/BP 4.04 on Natural Habitat; OP/BP 4.11 on Physical Cultural Resources; OP/BP 7.50 Project on International Waterways; OP/BP 4.12 Involuntary Resettlement; Public Consultation and Information Disclosure; The World Bank Group’s Environmental, Health and Safety Guidelines [4]

National environmental and social standards and targets in Vietnam utilized under this assignment are mainly derived from the Environmental Protection Law No. 55/2014/QH13 by the National Congress of the Socialist Republic of Vietnam adopted on June 23, 2014 [5]

3. Analyzing existing conditions of socio-economic and environmental baseline in the project area

3.1. Physical Environment

HCM City terrain gets lower from north to south and from east to west. There are three types of terrain: a) the high terrain lies in the north-northeastern area and part of the northwestern area

encompassing northern Cu Chi, northeastern Thu Duc and District 9. This is the bending terrain with average height of 10-25 meters. Long Binh Hill in District 9 is the highest at 32 meters; b) the depression terrain lies in the southern-southwestern and southeastern part encompassing districts 9, 8, 7, Binh Chanh, Nha Be and Can Gio. The area's height is in the range of 0.5 to 2 meters; and c) the medium-height terrain lies in the middle of the city, encompassing most old residential areas, part of districts 2 and Thu Duc, and the whole of districts 12 and Hoc Mon. The area's height is 5-10 metres.

Ho Chi Minh City, located in the downstream of the Dong Nai river basin system, has interlinked rivers and canals network. The Dong Nai River has many tributaries such as the La Nga River, the Nha Be River with average flow of 980 m³/s with the highest flow of 10,000m³/s during floods. The international waterway Saigon River originates from the Hon Quan District (near the border between Cambodia and Vietnam), Binh Phuoc Province, and flows through Thu Dau Mot to the HCMC with a length of about 200 km (80 kilometers in the city). The width of the Saigon River in the city ranges from 225m to 370m and its depth is 20 meters. The hydrological conditions of the rivers in Ho Chi Minh City area are influenced by semi-diurnal tidal variation of the East Sea.

Monitoring results measured at Phu An station in 2010 showed that the highest of average tide level in the Saigon River is 1.385 m. The highest water level was registered in November (1.55 m) and the lowest in July (-2.22 m) The average flow of the Saigon and Dong Nai rivers near the project site are 93 m³/s and 980 m³/s, respectively.

Ho Chi Minh City is currently facing the problem of environmental pollution [6]. Like other big cities in the country, untreated wastewater discharged directly into canals and rivers becomes increasingly popular. According to a report from the Ho Chi Minh City Environment Protection Agency (HEPA) [7], approximately 6000-6500 tons of urban solid wastes are discharged daily, among which about 4900-5200 tonnes are collected by the waste treatment companies; 700-900 tonnes are recycled, and the remaining volume are discharged into canals and the surrounding environment. The domestic solid wastes are estimated to be around 5500 tonnes per day; industrial solid wastes 500 tonnes per day and hospital waste 20 tonnes per day. It is estimated that

in the upcoming years, the average amount of garbage will increase by 10% per year.

In the recent years, heavy flooding has become common in Ho Chi Minh City, especially during the rainy season from June to November, and during high tides from September to December. The causes of flooding include heavy rainfall, high tides, poor drainage systems in urban areas, inadequate coordination between the operation of reservoirs and land subsidence from groundwater pumping. The city drainage system has been getting old with inadequate capacity for drainage during heavy precipitation [8][9][10]. In addition, drainage system is still unavailable in many areas of the city. Urban flooding due to heavy rains has therefore become a major concern.

According to a feasibility study in 2012 for sub-basin including Tham Luong - Ben Cat - Nuoc Len conducted by Ho Chi Minh City People Committee [11], flooding has become an annual event on the catchments that affected 5944 ha (40% of the total area of sub-basin) and about 700,000 people (35% of the population living in sub-basin). The depth of flood ranges from 0.5m to 1.2m on average and flooding time is about 30 minutes to 150 minutes.

Industrial production along the Tham Luong canal is recognized as causing the most serious pollution and one of the factors causing its canal stream described as a dead canal. Survey results in 2011 from the basin showed that wastewater volume from enterprises outside the Industrial Zone is 30,000 – 40,000m³/day, including more than 2.4 tons of suspended solids. At the Industrial Parks such as Tan Tao (Binh Tan District), Tan Binh (Tan Binh District), Vinh Loc A (Binh Chanh District), Tan Thoi Hiep (District 12), total wastewater is more than 32,000m³/day. Even if its water treatment system is up to standards, 6.4 tons of suspended sediment are still being discharged into Tham Luong canal, not to mention tons of smoke and dust emitted from loads of chimney of dyeing facilities owned by private sector and tons of garbage and waste illegally dumped along the canal.

Air sampling and survey results show that the air quality in Tham Luong - Ben Cat - Nuoc Len Canal basin is significantly affected by foul odour from Tham Luong - Ben Cat - Nuoc Len Canal due to the presence of NH₃, H₂S, VOC; pollutants generated from wastewater from domestic and surrounding

industries; and air emissions from vehicles and traffic congestion.

3.2. Biological Environment

Surveying and sampling were conducted on 12 and 13 October 2015. The Aquatic and Plankton sampling were taken at 10 points for two tides (high tide and low tide) including 02 samples at the two ends of the main canal, 06 samples at conjunction of the 06 secondary canals with the main canal; 01 sample in the central section of the main canal at the An Lac bridge near Tan Tao Industrial Zone Wastewater Treatment Plant (WWTP); and 01 sample near outlet of the WWTPs of Tan Binh.

Results indicated a total of 31 species of phytoplankton all of which originated from freshwater. In addition, 15 species and 1 larva of zooplankton were recorded in the project area all of which also originated from freshwater. The quantity of benthic macroinvertebrates in the project area is very low ranging from 0 to 660 organisms/m². There were 6 species of fish belonging to 6 families, 6 genera, and 3 orders at Tham Luong sluice - Ben Cat - Nuoc Len canal that were found. Near An Phu Dong ferry areas, from Mieu Noi to the junction of Saigon River, 5 fish species were also found.

Average fishing production of long trap net is about 2-5kg/per day. Of this, *Anabas testudineus* makes up 32% of the total species; *Clarias gariepinus*: 20%; and *Trichopodus trichopterus*: 5%. The remaining fish species make up for the rest. Large size species are released into the river for religion purpose. These make up 43% of the total species.

Results record that these fish species have high fishing production during the rainy season with a production estimate 10-30 kg/per day for long trap net and electronic scoop net. *Clarias gariepinus* and *Monopterus albus* are the main species that are caught by cast net and long trap net but the number of individuals caught at the Nuoc Len bridge areas are only few. They concentrate mainly closer to shore but almost totally absent in the river bed.

3.3. Socio Environment

Ho Chi Minh City plays an important role in Vietnam's economy and is an important traffic hub of Vietnam and Southeast Asia, including road, rail, waterways and air. In 2011, its Gross domestic product (GDP) is estimated at VND 512,721 billion, accounting for 20.91% GDP of the whole country

representing a 21.42% increase compared to 2010. Its economy is made up of a diverse sector consisting of mining, fisheries, agriculture, processing industry, construction, tourism, and finance. State-owned sector of the City accounts for 33.3%, while Non-state-owned accounts for 44.6%. The rest are foreign investments. Services account for the highest proportion: 51.1% while the rest of industry and construction accounted for 47.7%; and agriculture, forestry and fisheries accounting for only 1.2%.

Ho Chi Minh City is comprised of 19 inner districts and 5 suburban districts with a total area of approximately 2,095.01 km². As of 2012, the city's population was about 7.8 million (male population is 3,585,000 million while female population is 3,936,100 million) with a population density of 3,699 persons/ km². The population of Ho Chi Minh City had increased rapidly since 1975.

The project area covers approximately 14,900 hectares (7% of the city area) with a population of about 1,108,260 people (2007 statistics). During the wet season, the flooded area is about 3,714 hectares and 232,700 people live in these flooded areas (data from the feasibility study report). The main income of households in the project area comes mainly from salaries. They are mostly workers of factories and plants, while part are state employees and officials. The highest percentage of households with income sources from public sector staff and workers is Tan Binh District, followed by Binh Chanh and Hoc Mon. In addition, there are 118 households (31.1%) earning incomes from business operation, mainly from small businesses like restaurants, groceries in the markets and schools; income from this source concentrates most in District 12, accounting for 66.7%. The percentage of households with income from livestock, agriculture or gardening is very small.

The project area has a total of 3,669 poor households with average income of less than 12 million VND (600 USD approximately) per year; and a total of 35,178 nearly poor households with average income of between 12-16 million VND per year. Four (4) of the nine (9) districts within the project area reportedly do not have poor households. But all districts reported nearly poor households. Hoc Mon District has the highest number of poor households (1115) while Binh Chanh District has the highest number of nearly poor households (10,317).

3.3.1. Scope of Land Acquisition For Phase 1

A drainage and pollution improvement project for canal Tham Luong – Ben Cat - Nuoc Len was approved by HCMC in May 2002, and the design

subsequently amended in February 2007 and July 2012. The project covers 8 districts of HCMC, of which 7 districts were subjected to land acquisition and resettlement impacts, including Binh Tan, Binh Chanh, Tan Phu, Tan Binh, District 12, Go Vap and Binh Thanh. The total land area affected by the project was calculated as 153.46 ha, with a total number of 3,212 Households being affected (see details below). As these activities are linked, a due diligence of the resettlement conducted under City-funded activities has been prepared to ensure its consistency with the WB OP4.12 that all affected people are able to restore or improve the lost assets and livelihood as before the project.

The Project requires permanent acquisition of 1,534,600,000 m² belonging to 3,212 households and enterprises. By land use, these comprise 309,527m² of residential land; 238,822m² of specially used land, and 986,251 m² of agricultural land. The severity of project impact is as follows:

- 1,342 households have to relocate, of which 946 households registered to receive resettlement houses while 391 households opted for self-relocation;
- 1,870 households are partially affected of which, 498 households have partially-affected houses and have sufficient remaining area to reorganize (including production establishment/business households);
- 46 enterprises are also affected by the Project.

The estimated compensation cost of the project is 1,716.93 billion VND. Land Acquisition Progress to date is as follows:

- Three (3) districts (Binh Chanh, Tan Phu, and Binh Thanh) have completed the land acquisition activities for the Project. The remaining four districts (Binh Tan, Tan Binh, District 12, and Go Vap) have not yet finished land acquisition;
- Of the total number of affected houses (AHs) - 3,212, a total of 2,937 households have already handed over site to the Project;
- Of the total number of AHs who have not yet handed over the site (268 households), 44 households have already received compensation. The compensation for 212 households were

deposited in the bank while the remaining 12 households have not yet been provided with compensation.

In Binh Tan District, 19 households who are affected by Phase 1 of the Project will continue to be affected in Phase 2. Of this total number, five households will be fully affected.

Outstanding issues hampering the conclusion of land acquisition and resettlement includes: low compensation rates; no regulation to support affected tenants; non-disclosure of Directive No. 08/2002 as a cut-off date to structures; the resettlement sites are not appropriate; and project delays and re-encroachment among others.

There were no reported ethnic minorities of the project population that will be affected by land acquisition and resettlement. World Bank OP 4.10 is therefore not necessarily triggered.

3.3.2. Scope of land acquisition for Phase 2

Land acquisition for Phase 2 of the project is to be implemented in the area of 15 wards in 4 districts of HCMC, including:

- Binh Tan District: An Lac Ward, Binh Hung Hoa B Ward, Binh Hung Hoa Ward;
- Go Vap District: Ward 6, Ward 5, Ward 13, Ward 14, Ward 15, Ward 16, Ward 17;
- District 12: Thoi An Ward, Thanh Xuan Ward, Thanh Loc Ward, An Phu Dong Ward;
- Tan Binh District: Ward 15.

The project will acquire 159,945 m² of land belonging to 697 households (HHs), 10 companies, and 10 other organizations (including the Ward People Committee). The land area that needs to be recovered is as follows:

- Residential Land: 24,205 m², making up 15.1%;
- Gardening land: 18,094 m², making up 11.3%;
- Agriculture land: 84,388 m², making up 52.8%;
- Non-agricultural Land: 9,457 m², making up 5.9%;
- Land of rivers, streams, canals: 18,645 m², making up 11.7%;
- Other land: 23,801 m², making up 14.9%
- There are 65 HHs severely affected, of which 60 AHs suffer from more than 20% and 5 AHs suffer from more than 10% (for vulnerable households) agricultural land (including gardening land);

- There are 481 HHs having affected houses, of which 74 HHs affected completely and 392 HHs affected partly, of which 290 HHs can be renovated and continue living;
- There are 157 affected household businesses, of which 78 HHs with business registration. Of the above, there are two completely AHs with income from operations;
- 38 HHs out of the 697 AHs by project are identified to be vulnerable ones.

4. Analyzing Social impacts and proposing mitigation measures

The SIA (Social Impact Assessment) was conducted through a combination of qualitative research methods, quantitative household surveys, field work and desk study. The social extent of the project was determined through a combination of stakeholder analysis and social mapping, and through an iterative process of understanding the social, economic, political and environmental changes induced by the project and the livelihoods and networks of potentially impacted people.

The impact-based stakeholders of the project includes: physically and economically displaced people; people living in communities close to the Project area; local labour pools for job seekers; local women's groups; local business owners, such as fish farmers; local social and community service providers (e.g. health and education); local governmental bodies related to public welfare, environmental protection and permitting for the Project; neighbouring and supply chain industries and businesses including livestock owners.

The interest-based stakeholders comprises those persons or organizations that may be interested in or able to influence the outcome of the Project, either because they can contribute knowledge or improve Project design or mitigate social and/or environmental impacts, or because they have political influence in the Project that needs to be considered. These include the following: International Bodies such as the World Bank; National Government agencies; Provincial/Local Government Departments; Civil Society, NGOs, Research Bodies; and the Press and Media.

Potential social positive impacts anticipated during project construction include the following: creation of employment opportunities; and increase

in business opportunities in local services. The positive impacts of the overall project after construction include the following: poverty reduction; improvement of living conditions; improvement of transport conditions/accessibility; improvement of work environment, and social security; leisure and tourism; increased property prices; and increased business opportunities.

The implementation of the project requires permanent land acquisition of 159,945 m². This land area is under the land use rights of 717 households and organizations, including 697 households, 10 companies and 10 other organizations (including ward level People's Committee) and is under the management of 15 wards and communes in the project area. The composition of acquired land is as follows:

- Residential land: 17,598 m²
 - Agricultural land: 131,773 m²
 - Garden land: 18,714 m²
 - Annual tree land: 17,186 m²
 - Other agricultural land (vacant land, perennial crop land, pond land): 95,873 m²
 - Non-agricultural Land: 10,877 m²
 - Other land (including land for park zone, land gathering of soil and stone): 24,798 m²
- By household:
- 493 HHs with affected residential land;
 - 201 HHs with affected agricultural land;
 - 7 HHs with affected non-agricultural land;
 - 23 HHs with affected other land (including land for business establishments, or other dedicated land).

38 HHs out of the 717 AHs are identified as vulnerable HHs, including:

- Single-woman head of household with dependents: 17 HHs;
- Ethnic minority HHs: 2 HHs;
- HHs with disabilities: 4 HHs;
- Poor HHs: 7 HHs.

- Family policy HHs: 8 HHs.

In addition to the potential negative consequences resulting from land acquisition which has been described in the Resettlement Action Plan, social negative impacts include the following: influx of temporary workers, impacts on agriculture, temporary impacts on business and income of local households around the project construction site and creation of haven for homeless people and possibility of social evils when the construction is finished. The majority of impacts identified during the impact assessment can be reduced to low significance following the implementation of mitigation measures. However, impacts of physical displacement remain of moderate significance, even with mitigation due to their permanent nature. As such, monitoring and management measures should extend throughout the life of the project in order to ensure that the quality of life of displaced persons is equal to or better than prior to displacement.

Mitigation Measures for the Negative Impacts

A Resettlement Action Plan (RAP) which includes compensation policy for structures and loss of assets and support with moving to a new location and establishing a new home has been developed separately from the ESIA report to mitigate the negative impacts resulting from land acquisition. Influx of temporary workers – requirements shall be sourced from the local population to minimize population influx. In addition, contracts for civil works should include legal covenants requiring priority to be given to local residents for project employment.

Impacts on agriculture – The negative impact on agriculture is temporary during the construction phase and can be easily mitigated by controlling the flow of water in the canals during construction. Therefore, the project construction can be considered to have negligible impact on agricultural activities.

Temporary impacts on business and income of local households near the construction site - Local business owners around the construction site should be fully informed about the inconveniences resulting from the project construction so that they can prepare themselves to minimize income loss.

Enhancement Measures for Positive Impacts

Creation of employment opportunities during the construction phase – a local labour desk at the

Contractor offices should be established to identify a local labour pool. Information about recruitment of employers and workers should be widely disseminated to the local people. Skill development programs should be implemented to ensure support for local population in obtaining employment opportunities.

Increase in business opportunities during the operation phase – business establishments catering to customers that provide environmental and sanitation services (i.e. providing trash bins, toilets, etc.) should be given some economic incentives.

Leisure and tourism - Local governments can work with the retired and the elderly who have a reputation in the community to discourage people in the area from throwing garbage into the canals and waterways. Besides, placing additional trash bins and warning signs is another effective way to reduce throwing wastes down into the canal. The trash cans must always be kept clean and convenient for people to dispose of waste. People who fail to follow regulations should receive a fine.

5. Conclusions

This project will improve capacity building in anti - flooding and flood risk management in combination with sanitation enhancement for Ho Chi Minh City. All construction and planning considerations will be integrated in order to prevent tide flooding, drainage problems, and inner city inundation taking into account “climate change”. At the same time, this project will address the World Bank’s dual objectives of poverty eradication and prosperity promotion .

During pre-construction, construction, and operation, the SCFC commits to apply mitigation measures identified in the Environmental and Social Management Plan (ESMP) in order to address the negative environmental or social impacts in accordance with Vietnamese and World Bank regulations. Staff and workers shall be trained to enhance their managerial capabilities, ensure effective operational safety, and control environmental pollution.

The SCFC will coordinate with authorities during the pre-construction, construction and operation stages of the project to fully implement mitigation measures to control pollution and other harmful environmental impacts, and to prevent environmental incidents.

6. Acknowledgements

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