



## **Sustainable Economic Development of Mekong Delta Key Economic Region in the Context of Climate Change**

Ta Van Trung<sup>1</sup> and Le Thu Hoa<sup>2</sup>

<sup>1</sup> Vietnam Environment Administration, Ministry Of Natural Resources and Environment, Vietnam

<sup>2</sup> Faculty of Urban & Environmental Economics and Management, National Economics University, Vietnam

<sup>1</sup> Email: tavantrung@vea.gov.vn, <sup>2</sup> Email: hoalethu@neu.edu.vn

### **Abstract**

Recent studies have shown that Vietnam is one of the countries which are most vulnerable to the effects of climate change and climate change might worsen the available risk to natural resources, agriculture, food security, infrastructure, health, and pose a major threat to economic development, human as well as environment in Vietnam. According to Decision No. 245 / QĐ-TTG dated 12 January 02, 2014 by the Prime Minister approving the overall planning for economic - social development of Mekong Delta key economic region by 2020, and oriented to 2030, the Mekong Delta focuses on food production, fisheries, fruit, energy center, major tourist center and serves as a bridge in the regional economic integration of Vietnam. However, this key economic area is one of the three deltas, most badly affected by climate change, facing threats and serious challenges to the sustainable development. This paper analyzes the current situation of economic development, assesses the impact of climate change on the Mekong Delta key economic area, suggesting some basic solutions to the region's sustainable economic development in the context of climate change.

**Keywords:** Climate change, sustainable economic development, Mekong Delta key economic region



## 1. Introduction

Sustainable development is an urgent need and an essential trend in the process of socio-economic development, ensuring food security, national defense of all nations. Since the introduction of the concept of sustainable development, economic development, development of the key economic region, and climate change are widely discussed in many national and international conferences and seminars with a growing awareness of the extent to which globally that climate change will have a major impact on all three - economic, social and environmental dimensions of sustainable development.

Economic studies on the impacts of climate change of governments and scientists around the world (CBO, 2003; CEAD, 2014; Franhauser & S.J.Tol, 2005; Harris, Roach, & Codur, 2015; Mendelsohn, 2009; Stern, 2006) has been pointed out that: (i) the sectors vulnerable to climate change are agriculture, forestry, tourism, marine resources, water resources; (ii) some countries, especially developing countries, are more vulnerable than before as the rate of the agricultural and forestry sectors is relatively high in the economy while these two sectors most vulnerable to the impact of climate change; and (iii) climate change will reduce social welfare, thereby reducing the quality of human life. Although there are still differences in the estimates and forecasts for climate change damage in the studies however all the studies suggest that climate change will seriously affect production, livelihoods and the environment. thereby reducing economic growth and slowing down the process of achieving sustainable development Goals (SDGs) of countries.

In Vietnam, study on the impact of climate change on economic development is relatively new issue. The major researches on the impact of climate change to economic development (CIEM, 2012; IMHEN, 2010, 2011) showed that climate change has been and will affect almost all socio-economic sectors in Vietnam. If Vietnam's economy continues to grow at a rate of 5.4% per year for period 2007-2050, the growth rate affected by climate change (particularly storms) may be from 5.32% to 5.39%. That means the rate of growth has decreased but not significantly. If Vietnam's gross domestic product (GDP) in 2050 exceeds \$ 500 billion, the damage from climate change could reach \$ 40 billion by 2050 - a relatively large loss in absolute value and possibly reduce if Vietnam has a suitable and effective policy response to climate change (CIEM, 2012).

People are vulnerable to the effects of climate change, including those living in coastal areas (where sea level rise is causing increasing risk of flooding and saline intrusion), and in the river delta of Vietnam (they are experiencing higher risk of flood); Women, children and the elderly, ethnic minorities, the poor in urban areas... The sectors affected seriously are agriculture and aquaculture (including the infrastructure of these sectors) and security food of the whole country. (CIEM, 2012; IMHEN, 2010, 2011)

The key economic region is special region, more beneficial than other regions. Requirements for sustainable development of the key economic region must be placed on two aspects: on one hand, the region development must be consistent with the national sustainable development framework, conception and expectation; on the other hand, there are specific requirements for the region as a dynamic center, creating premises and attracting resources from other regions (Le Thu Hoa, 2007; Nguyen Van Nam & Ngo Thang Loi, 2010; Ta Dinh Thi, 2007) Therefore, sustainability of the economic growth of a key economic region depends on internal sustainable development, the level of spreading and regional connectivity between the inter-provincial areas, and with outer-provincial regions.

Vietnam is one of the five countries most severely affected by sea level rise and the Mekong River Delta is one of the three deltas in the world most badly affected by climate change.

(World Bank, 2007), the regional economic development faces significant challenges as limited resources are being given greater priority to addressing domestic pressures related to poverty reduction, infrastructure shortage, and exhausted natural resources. Environment pollution and damaged ecology in the recent years have had a huge impact on economic development and increased the vulnerability of the region influenced by climate change.

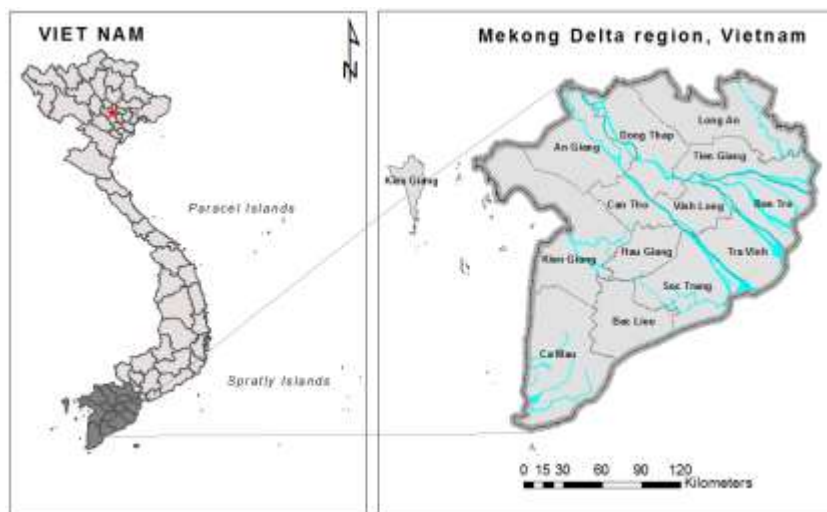
### ***Curent state of economic development of Mekong Delta key economic region***

#### ***Achievements***

The Mekong River delta key economic region was established under the Prime Minister's Decision No. 492 / QD-TTG dated April 16, 2009 approving the Scheme on the establishment of the Mekong Delta economic zone, including Can Tho, An Giang, Kien Giang and Ca Mau provinces, with target becoming a dynamic development zone with modern economic structure, contributing more and more to the country's economy, contributing to the development of the whole Mekong Delta region. Social, cultural progress keeps pace with the common ground of the whole country, ensuring stable politics and security defense. This is a key area for food, fishery and fruit production, contributing significantly to the national food security, making a great dedication to agricultural and aquatic exports of the country.(Prime Minister, 2009).

In the past few years, localities in the region have got important achievements in socio-economic development. The economic growth rate has continuously increasing. The economic structure has been gradually shifted towards industrialization and modernization. The proportion of poor households has been decreasing rapidly and living standard has been improved. The economic growth rate of the region remained relatively high compared to the national average and the Mekong Delta. The average growth rate in 2017 of the provinces in the Mekong Delta key economic region, except for An Giang province (An Giang reached 5.11%), was relatively high, higher than the national average (6,81%).

Per capita income and living standards in the provinces have improved steadily over the years. Agriculture has developed steadily, confirming its role of the foundation, occupying a high proportion of the regional economy, step by step forming some models of linking production along the value chain, distribution network, retail network spreading from urban to rural areas.



*Figure 2: Map of Mekong Delta region in Vietnam*



Industry - construction development is quite good, transport infrastructure started to develop, creating connections between localities; Many new urban areas and resettlement areas have been built by the localities. Some important structures have been upgraded to create a synchronous transportation network in the area. Trade and service account for a high proportion of GRDP in the region, with an average growth rate of 12.82% for the period 2011-2016.

In addition, the social security in the area is guaranteed, the material and spiritual life of the people is constantly raised, the proportion of poor households decreased rapidly and lower than the average of the whole region. In 2011, the proportion of poor households in the whole region is about 8.06%, by the end of 2015 only 2.62%. (GSO, 2011-2015)

### ***Weakness***

Despite important achievements in socio-economic development, the Mekong Delta key economic region still has some limitations affecting the general economic development of the region. This makes the results of regional economic development not really convincing, not corresponding with the potential to become an economic center, create a spreading force and promote economic development of localities in the Mekong River delta.

The structure and economic scale of the region are small, unsustainable; growth quality and competitiveness are not high; The regional economy depends on agriculture with the structure accounting for about 30%, so the development is unstable, depending on weather and external conditions (GSO, 2016b); Industry accounts for about 27%, but mainly the processing industry (GSO, 2017b); The investment environment is not good enough to attract investment, especially foreign investment. The number of projects attracting FDI in the region only accounts for 12% of the Mekong Delta and 0.7% of Vietnam (GSO, 2011-2015). The quality of human resources in the whole region is still low. The proportion of trained employees in the Mekong Delta key economic region in 2017 is 45.72%, lower than the national average of 54.52% (GSO, 2017a). The management and plan implementation are not good, not promoting the strength of Can Tho city as a center of the region, connecting with Ho Chi Minh City, the largest center of socio-economic of Vietnam. The infrastructure is the weakness with narrow roads, uncomprehensive national roads, poor service and tourism; limited medical facilities; research and transfer of scientific and technological application has not really created a motive force for socio-economic development.

The basic characteristics of the economic development of the region are still based on cheap labor. The monthly average income per capita in the Mekong Delta provinces, except Can Tho (3,347,000 VND / month), is lower the national average monthly income per capita. The monthly average income per capita in Ca Mau province is lower than that of the Central Highlands and the Central Coast region, which do not have favorable conditions for socio-economic development (GSO, 2017b).

Due to the unsustainable exploitation of natural resources and backward technology, the environmental pollution is becoming increasingly alarming. The monitoring results show that the concentration of E. coli in rivers, and the Mekong Delta, canals and ditches two to five times exceeded the permissible limit. BOD and COD levels 1-3 times exceeded the permissible limits. Ammonia and some of the toxins from industrial and agricultural activities exceeded 5 - 10 times the allowed standard (MONRE, 2012b).

In addition to one of the five countries most severely affected by sea level rise, the Mekong Delta is one of the three deltas in the world most affected by climate change. (World Bank, 2007), The Mekong Delta key economic region is facing serious challenges from the impacts of climate change and water source security.



## 2. Research methodology

**Point of view:** Sustainable economic development is sustainable economic growth accompanied by development of health care, education, social welfare, environmental protection, and climate change response. Sustainable economic development in the key economic region means the sustainability of the region's economy itself, and a leading role in supporting the development of surrounding areas. In such context, climate change should be consider not only the harmful factor but also the opportunity to innovate technology, restructure the economy, minimise danger, taking advantage of the opportunity that climate change brings about.

**Research approaches:** The research frame approach is shown in figure 1.

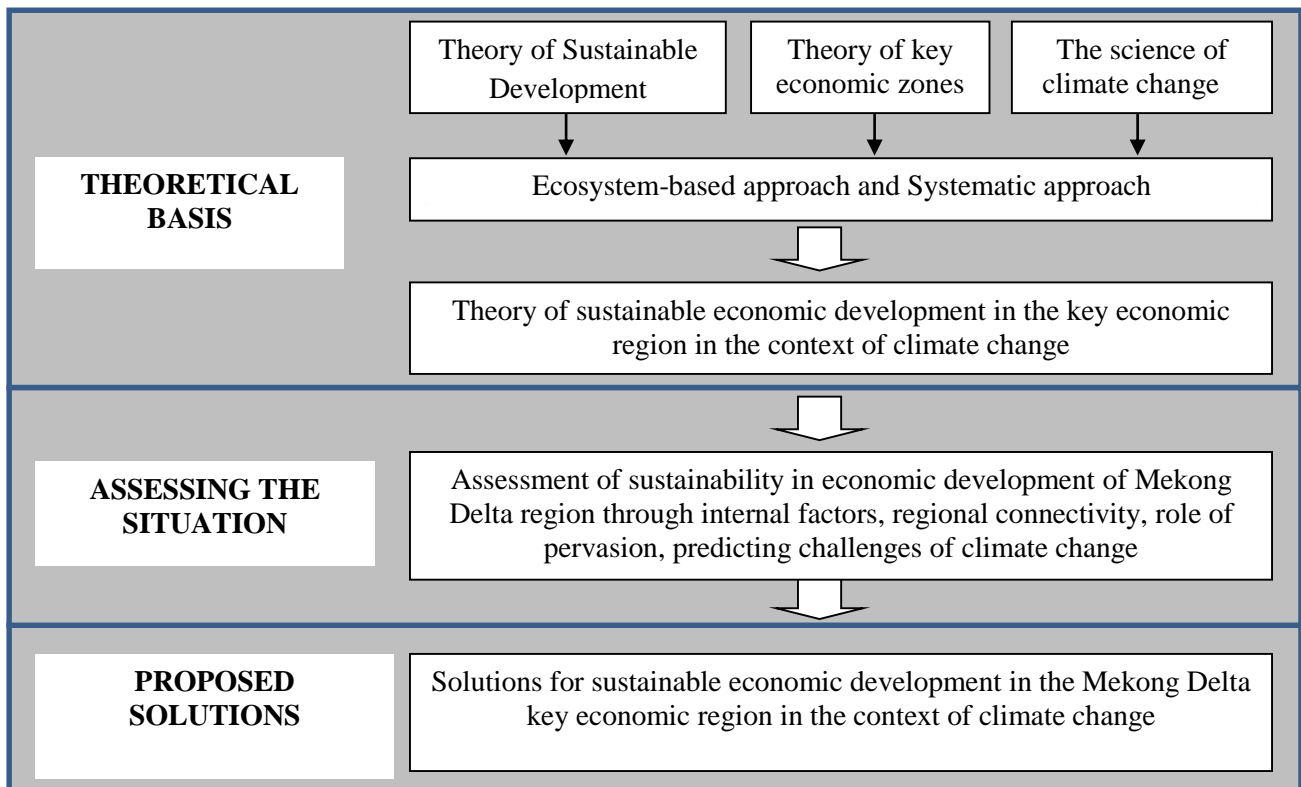


Figure 1: Research frame for sustainable economic development of MD key economic region

### **Method of assessing the sustainable economic development of the region**

Sustainable economic development of the key economic region means economic sustainability of the region itself, it also serves as a growth pole and plays a role in spreading to other regions throughout the country. There are close links between localities in the area.

Based on the research, a set of criteria to assess sustainable development in Vietnam and in the world, experience of highly developed countries, of similar- condition countries as Vietnam, and the existing statistics, the paper proposed indicators for sustainable economic development in the Mekong Delta key economic region according to the following groups: (1) spreading impact on economics, society, and environment, (2) internal sustainable development, (3) regional connectivity. Indicators of climate change mitigation and adaptation are in the group of indicators of Internal sustainable development. The specific indicators used to evaluate consists of 3 groups as in table 1.



*Table 1. Groups of indicators to assessing sustainable economic development in MD key economic region*

N <sup>o</sup>	Groups	Items	Indicator	
1	Internal sustainable development	-	GRDP growth	
2			Economic restructuring	
3			Trained employees	
4			Science and technology level of the economy	
5			Responding to climate change	Damage caused by natural disasters and climate change
6				Energy Consumption / 1 GRPD Unit
7	Spreading impact	Spreading on the economy	The contribution of key economic regions to the general budget revenue of the region	
8			Labor productivity	
9		Spreading on the society	The Human Development Index (HDI)	
10			Immigration, out-migration, net migration rates	
11			The difference in income per capita per month	
12			The proportion of poor households	
13		Spreading on the environment	The number of enterprises is fined for administrative violations of environmental protection	
14		Spreading on the policies	Local Competitive Capacity	
15			FDI investment	
16		Regional connectivity	-	The number of goods transported and circulated

*Source: Proposed by the authors*

The data used to evaluate is from statistics of the General statistics office of Viet Nam (GSO) and the reporting of VCCI and UNDP.

### 3. Research results

#### 3.1. The state of MD region's economic sustainable development

The results of the assessment of the sustainable development of the region based on the above criteria are as follows:

- **Region's internal sustainable development**

(i) *GRDP growth*: In the period of 2013-2016, the average growth rate of provinces in the Mekong Delta key economic region was clearly differentiated. Two provinces such as Kien Giang and Can Tho had a stable growth rate, always higher than the national average but two remaining provinces An Giang and Cà Mau experienced the unstable growth. An Giang and Ca Mau in two consecutive years (2015-2016) all had low growth rates in the whole country. This is explained by the fact that these two provinces have a major economy dependent on agriculture and aquaculture, while in 2015-2016 the entire Mekong Delta was hit hard by drought and salinity intrusion which has been considered the record in the past 100 years.



Table 2. A set of criteria assessing economic growth in key economic region

Unit: %

GDP/GRDP	2013	2014	2015	2016
Vietnam	5.42	5.98	6.68	6.21
Can Tho	14.59	8.65	10.50	7.55
An Giang	7.33	7.28	4.20	5.11
Kien Giang	10.00	9.72	7.73	8.50
Ca Mau	11.05	8.78	3.54	5.2

Source: (GSO, 2011-2015, 2017b)

(ii) *Economic restructuring*: In the period of 2013-2016, the economic structure of the provinces in the region except for Ca Mau province has shifted in the right direction, gradually reducing the proportion of agriculture, forestry, and fishery, increasing the proportion of Construction and Trade - Services in the structure of the economy. The annual growth rate in Industry - Construction, Trade and Services of these localities reached an average higher than the national average of 9.5% and 6.5%, but still rather slow compared to other localities in other key economic regions in country. Especially, the statistics from Ca Mau province showed that the industrial and construction sector in the period 2014-2016 went down from 29.57% to 29.12%, the growth rate of industry and construction of Ca. Mau was only 1.41% in 2015.

(iii) *Trained employees*: Human resources are one of the pillars of economic development. Although the number of the trained employees of the localities in the region and the Mekong Delta has increased significantly, higher than the average of the Mekong Delta but has not met the demand. Especially, three quarters of localities in the key economic region has the rate of trained employees lower than the average of the Mekong Delta. Only Can Tho City has a higher rate of trained workers than the average of the Mekong Delta but still lower than the national average.

Table 3. Trained employees in the Mekong Delta key economic region in comparison with the whole country and the Mekong Delta

Unit: %

Country/Region/Province	2011	2012	2013	2014	2015	2016
Vietnam	15,4	16,6	17,9	18,2	19,9	20,6
Mekong Delta	8,6	9,1	10,4	10,3	11,4	12,0
An Giang	8,0	9,0	10,6	9,8	8,5	10,1
Kien Giang	9,9	9,0	9,7	9,3	10,5	12,3
Can Tho	13,0	14,7	15,2	16,9	18,5	19,9
Ca Mau	5,5	5,1	7,5	7,1	9,7	10,2
Mekong Delta key economic region	8,99	9,34	10,64	10,51	11,20	12,64

Source: (GSO, 2011-2015, 2017b)

(iv) *Science and technology level of the economy*: The science and technology level of the economy evaluated by the index of Professional, scientific, and technical activities in the period 2011-2016 are generally still low. The GDRP contribution of this sector is limited in comparison with the GDRP contribution of the region. The value of professional, scientific and technical activities of the region is generally higher than the average of the Mekong Delta, but much lower than the national average. Can Tho city has the highest professional, scientific and technical index in the four provinces, reaching an average of 0.71% but still much lower than the national average



of 1.3%. The major contribution to the regional economy is mainly from agriculture and processing industry.(GSO, 2011-2015).

(v) *Responding to climate change*: In the recent years the Mekong Delta is one of the regions most affected by natural disasters, especially the salt drought in 2015. According to estimated data from localities in the area, in the period 2010-2015, the entire Mekong Delta key economic region lost more than 3,500 billion VND. This shows that the economy of the region is not really sustainable, depending much on nature. The region has not had capacity of actively responding to natural disasters and climate change (GSO, 2016b).

In the field of energy consumption, with efforts to renovate technology, switch production models, energy consumption in economic development of the region has seen positive changes, reduction in consumption energy for a GRDP is estimated at 7.3% compared to 7% of the country, which is due to the region's strong agriculture and processing industries.

▪ ***Region's spreading impact***

(i) *Spreading impact on economics*: According to statistics, in the period 2011-2016, although the proportion of large budget contribution accounted for about 47.5% of the entire Mekong Delta region, the economic development of the region was not good. Labor productivity remains low, Can Tho is the only province which had higher productivity than the national average. Meanwhile other localities' are lower than the national average.

(ii) *Spreading impact on society*

– The Human Development Index (HDI) is a overall measure of the human development in terms of health (expressed by average life expectancy from birth); knowledge (expressed by the education index) and income (expressed by total national income per capita). According to the UNDP report, the HDI of the localities in the region has increased significantly, but only HDI of Can Tho is higher than the national average, three quarters of remaining provinces' are lower than the national average. (Can Tho: 0.788; An Giang: 0.730; Kien Giang: 0.750; Ca Mau: 0.724).(UNDP & VASS, 2016)

– Immigration, out-migration, net migration rates: During the period 2011-2016, the region's migration, out-migration, and net migration rates changed dramatically. Decreasing out-migration rates reflected the attracting labor and human resources in the region. Especially in Ca Mau province, the out-migration rate dropped from nearly 30% to 7.7% in 2010. However, the region's net migration rate was still higher than the average of both the Red River Delta and the Mekong Delta. Only Can Tho City had a lower net migration rate than the Mekong Delta (GSO, 2011-2015, 2017b).

– The difference in income per capita per month between the highest income group and the lowest income group shows income inequality among the richest and the poorest group in the region. This inequality is associated with the unequal sharing of social shift opportunities, and hindering intergenerational social shift, degrading social belief and faith in the institutions of the people. In the long run, the situation of inequality in income distribution will hinder the human development and harm the economic development of the whole region. The difference in the per capita income between 20% of the highest income group and 20% of the lowest income group in the region in 2010-2016 was lower than the average of the country, however, remained at a high level. Can Tho had the lowest difference in comparison to the rest of the province. However, the good signal is the ratio of poor households across the region could plummet, in 2011, the percentage of poor households in the region was about 8.06%, by the end of 2015 approximately 2.62% (GSO, 2011-2015, 2017b).





(iii) *Spreading impact on environment*: According to results of monitoring environmental quality showed that concentrations of E.coli bacteria in rivers and canals in the Mekong Delta 2-5 times exceeded the permitted level, the BOD and COD levels 1 - 3 times exceeded allowable limit, the concentration of ammonia and some toxins arising from industrial and agricultural activities 5 - 10 times exceeded permitted standards. This shows that the regional environmental quality is showing signals of decline (MONRE, 2012b).

According to the statistics from the Department of Natural Resources and Environment in the local areas, during the period 2010-2016, the number of cases sanctioned for administrative violations in the environmental protection in the region shows signals of a sharp increase in terms of frequency as well as the number of violations. This shows an alarming level of environmental protection in the locality.

(iv) *Spreading impact on policy*

To assess spreading impact on policy, PCI is the indicator used for evaluation. PCI is considered an important "voice" of private enterprises in the local business environment, which is a reliable reference channel for investment destinations, an important reforming motive for the business environment.

According to data released by VCCI in 2015, in terms of provincial competitive capacity, Ca Mau and An Giang still remained in the bottom of the country, reflecting the difference between the localities in the region in attracting investment. Of the 63 provinces and cities in the country, Can Tho ranked 11/63, followed by Kien Giang 13/63 and An Giang 38/63 and Ca Mau 54/63.

Enterprises are particularly important in the economy, which is a major contributor to the gross domestic product (GRDP). The number of enterprises doing business in the comparison with that in 2000-2015 shows that in this period, the number of enterprises in localities in the Mekong Delta has increased more slowly than that of the Mekong Delta and the whole country in general. Only Can Tho (12.5%) had an average growth rate higher than the average of Mekong Delta (8.6%) but still lower than the national average (17.6%).

Regarding foreign direct investment projects, according to statistics in 2016, there were 175 FDI projects in the Mekong Delta, of which only 11 FDI projects in the Mekong Delta, 1 in An Giang and 2 in Kien Giang, 8 projects in Can Tho with total capital of USD 242.4 million, accounting for 10.3% of the total FDI registered capital of the whole Mekong Delta.

▪ ***Regional connectivity***

Regarding the volume of goods transported in the Mekong Delta key economic region, statistics show that volume of the Mekong Delta key economic region accounted for 37% of the Mekong River Delta. However, the volume of goods transported in localities in the Mekong Delta key economic region has a considerable difference. Despite contributing 37% of the cargo volume of the whole Mekong Delta, Kien Giang made up for 22.79%, Ca Mau 0.8%.

### ***3.2. Challenges of Climate Change to MD Regional Economic Development***

#### ***a. Agriculture and fisheries***

The agricultural production in the Mekong Delta key economic region depends on natural factors such as land, water source, climate, hydrological regime, temperature, and humidity, so it will be the most severely affected by climate change in the region, specifically:

Flooding due to sea level rise will result in loss of agricultural land. If the sea level rises by 75 meters, it is estimated that 39 percent of the Mekong River Delta area will be flooded. The Mekong Delta key economic zone will be flooded with 32,399 hectares of one-crop rice,



106,723 hectares of two-crop rice, 25,352, 398 hectares of one-crop rice and freshwater fishery, 34,359 hectares of one-crop rice and saltwater and brackish water fishery. (Nguyen Hoang Dan, 2014)

- Salinity intrusion in coastal areas will also reduce the area of agricultural land. A large portion of the farm land will be salted because it is lower than sea level. Saline intrusion reduced the area of cultivated land. Therefore, the land use can reduce from 3-4 times per year to 1-1.5 times per year.

- Rising temperatures, drought (and lack of irrigation water) will affect the distribution of crops, especially reducing productivity. Loss of agricultural land and reduced crop productivity will pose challenges and threats to farmers' lives, rice export, and national food security. (IMHEN, 2010)

Mekong Delta key economic region currently has strengths in the fishery sector, especially fishing, and aquaculture. Calculation based on GSO data (2014), aquaculture produce of four provinces and cities in the Mekong Delta region accounted for 44.91% and 39.23%. Fishery output of the whole Mekong Delta accounted for 25.67% and 27.61% of the country's production. (GSO, 2016a)

Aquaculture livelihoods, including fishing and aquaculture, which are dependent on water and the richness of coastal resources, should be one of the most sensitive and vulnerable sectors to impacts of climate change. (IMHEN, 2010). In general, climate change will change the habitat of aquatic species, leading to a decline in the number of aquatic species due to migration and habitat degradation, reducing the fishing grounds, the produce of catching and aquaculture.

Due to limited capital and knowledge/technology, aquaculture activities are almost dependent on natural environment, weather, etc. Damage in aquaculture tends to increase in recent years due to the impact of rising sea levels, droughts, saline intrusion, unpredictable rain, water environment changes. According to the report of the General Department of Fisheries (2013), losses of aquaculture production in some provinces in the Mekong Delta in 2013 increased to 30-70% per year. (DOF, 2013)

#### **b. Industry**

According to the scenario of sea level rise of about 1 meter in the late 21st century, it will cause most industrial zones in Vietnam to be flooded, the minimum is over 10% of the area, the maximum is around 67% (MONRE, 2012a). The industrial zones in the Mekong Delta key economic region are located in the low-lying area, so the potential of flooding is very high.

Raw materials for the industry, especially raw materials for food processing, textile and garment industry in the Mekong Delta key economic region would significantly reduce because it is not supplied from the raw material areas in other provinces. The Mekong Delta will also be heavily flooded. This has put pressure on the shift of industrial structure in terms of industrial form, proportion of processing industry and high technology.

Rising temperatures increase energy consumption in industries: increasing the cost of ventilation, cooling and reducing the efficiency and output of power plants. Increasing domestic use of electricity and cooling costs in commercial industries also go up significantly as temperatures tend to increase.

Unusual storms and sea level rise will negatively impact the operation and exploitation of power transmission and distribution systems, oil platforms and oil pipelines, and increase the cost of maintaining and repairing energy works, affecting the energy supply, energy consumption, energy security of the region in particular and of Vietnam in general.

#### **c. Labor and society**

Climate change affects labor and employment in two distinct trends



(i) Climate change makes agricultural jobs more unstable, and working conditions worse.

(ii) Climate change causes a part of the labor force to change jobs (eg. from agriculture to industry, commerce, service), reducing working time, reducing income and increasing the number of migrant workers in the region.

Climate change contributes to poverty by negatively affecting household livelihood of which are climate-sensitive livelihoods such as agriculture, forestry, salt-making, and fisheries-key economic sectors in the Mekong Delta key economic region.

#### **d. Infrastructure**

Sea dikes: rising sea levels can make sea dikes unable to withstand the sea-level rise in the event of a storm, leading to the risk of dike breakage during major storms.

River dikes, dikes, and embankments: rising sea levels make water drainage to the sea decrease, leading to rising water levels in inland rivers, combining with increased flood flows from the upstream, the floods will increase, affecting the safety of river dikes in the northern provinces, dikes, and embankments in the southern provinces.

Water supply projects: Rising sea levels increase the salinity intrusion of the sea into the mainland, causing the underground water layers in the coastal area to be at risk of salinization, preventing water supply for production.

Urban Infrastructure: Sea level rise and tides will seriously affect coastal urban areas, affecting traffic, living and production activities.

### **3.3. Discussion:**

Although the proportion of budget contribution is large compared to the whole region, economic restructuring in the right direction, the economic development of the region still has limitations. There is no comprehensive development among localities in the region, the pace of economic restructuring is slower than the national average. Labor productivity is still low. Localities in the Can Tho region have higher productivity than the national average, but other localities' are lower than the national average. Energy consumption/ 1GRDP in the technical activities show signals of decline but the demand for energy to develop is increasing. Environmental quality is deteriorating. The human development index of the localities in the region is quite good compared to the whole country, but the gap between the rich and the poor is still high.

For PCI, Ca Mau and An Giang still rank low in the country. This shows the difference between the localities in the region in attracting investment. 11 FDI projects in the whole key economic region, 8 projects implemented in Can Tho province with provincial competitive capacity in the top of the country. The connectivity between localities in the area is still loose and there are sharp differences between localities in the region.

This shows that the economic development of the Mekong Delta key economic region got achievements in the past but it is not really sustainable and it does not deserve the potential and strength of the region.

In addition, the region is facing the challenges of climate change. According to the above assessment, it can be seen that climate change will affect almost all socio-economic areas of the region.

These effects are reducing rice output, rice export, the area of rice cultivation and aquaculture, human health. They have increased energy costs, affecting technical infrastructure of the area, migration from rural to urban areas, etc. This will put a lot of pressure on the economy that is not the sustainable development of the region.



#### **4. Recommendations to economic sustainable development in the Mekong River delta key economic region in the context of climate change.**

- Review, supplement, adjust policies to improve the investment climate and move quickly from a production-based economy to an investment-based economy. Besides, there should be tax policies, financial management policies for enterprises, appropriate monetary policies to enhance the economic restructuring in the direction of industrialization and modernization.
- Diversify forms of investment, encourage the development of capital markets; attract foreign investment capital and domestic capital sources inside and outside the region; enhance solutions to raise the efficiency of investment capital, especially budget capital; address the spontaneous situation in attracting investment; ensure the balance between borrowing and paying capacity, foreign currency balance and other macroeconomic balances in the long run (ODA loans of the Government and loans of the business sector keep the ratio of about 30% of total social investment capital).
- Long-term development planning of all economic sectors in the process of industrialization and modernization up to the year 2020 within the framework of strategy and overall plan of the economy, create conditions, opportunities and encourage various economic sectors to cooperate with each other; create favorable conditions for various types of economic sectors to be formed and developed in rural, mountainous, and remote areas
- Complete the policy on land, especially the policy on allocation of agricultural and forestry land and sea land to households for long-term use, developing new cooperatives (renting farmers' land for more efficient production based on the use of high technology in production and development.)
- Adjust the investment structure in line with the objective of economic growth and the social objectives, create conditions to exploit strengths of internal resources of all economic sectors; adjust state budget expenditures and reserve enough budget for human and social development, ensuring that at least 1% of the total expenditures for the environmental cause.
- Enhance attracting FDI investment for suitable projects, especially projects of infrastructure development in rural areas through the preferential policies such as minimum decreased rental rates for land, water and sea surface, support for partners which Vietnam wants to cooperate in their territories.
- Continue to invest in upgrading infrastructure, creating favorable conditions for the development of trade, transportation and trade inside and outside the region.
- Continuously promote the policies and shift the structure towards reducing the proportion of agriculture, forestry, and fisheries to the industry, construction and service sectors.
- Strengthen training and development of high-quality human resources for economic sectors and areas in the region.
- Integrating climate change into the plans and strategies for development of branches and localities in the region.

#### **5. Conclusion**

Climate change is considered one of the most important issues in the world today as it greatly affects the socio-economic development of all countries. All human's efforts to develop may be destroyed by climate change. Among the countries most severely affected by climate change, Vietnam's economic development, especially the economic development of the Mekong Delta region in general and the Mekong River Delta Key Economic Region in particular, is expected to decline; farmers' lives, rice exports, and national food security will be threatened by the loss of agricultural land and the decline in crop yields, productivity of fisheries and aquaculture;



Expenditures in industry will increase due to rising temperatures; Employment in climate-sensitive sectors has become more unstable, thereby increasing the incidence of poverty and disease among the population.

Based on the study on economic development, sustainable development in the country and in the world, research and assessment of the development situation as well as impacts of climate change on the socio-economic areas of the region, the article proposes a few solutions to sustainable economic development for the Mekong Delta key economic region in the context of climate change. However, these are only initially proposed studies.

For the truly sustainable economic development of Mekong River Delta Key Economic Region in the context of climate change, we need more research, deeply assessing the impact of climate change on the regional economy, and offering suitable development solutions so that Mekong River Delta Key Economic Region will deserved its role, and potential development of the region.

## REFERENCES

CBO. (2003). *The Economics of Climate Change: A Primer*. US: The Congress of the United States, Congressional Budget Office.

CEAD. (2014). *The Economics of Climate Change*. Melbourne: Committee for Economic Development of Australia.

CIEM, Central Institute for Economic Management. (2012). *Implications of climate change for economic growth and development in Vietnam*. Hanoi: Statistical Publishing House.

DOF, Directorate of Fisheries. (2013). Report No. 730 / TCTS-NTTS dated 23 March 2013 of the General Department of Fisheries on the situation of raising clam and shrimp in the Mekong Delta.

Franhauser, Samuel, & S.J.Tol, Richard. (2005). On Climate Change and Economic Growth. *Resource and Energy Economics*, 27, 1-17.

GSO, General statistics office of Viet Nam. (2011-2015). *Statistical yearbook of Vietnam*. Statistical Publishing House: Hanoi.

GSO, General statistics office of Viet Nam. (2016a). Retrieved 22/3, 2016, from <https://www.gso.gov.vn/Default.aspx?tabid=706&ItemID=13412>

GSO, General statistics office of Viet Nam. (2016b). Socio-economic situation in 2016.

GSO, General statistics office of Viet Nam. (2017a). Report on Labor force survey in Quarter 4, 2017.

GSO, General statistics office of Viet Nam. (2017b). Statistics. Retrieved 9/8, 2017, from <http://www.gso.gov.vn/Default.aspx?tabid=706&ItemID=13412>

Harris, Jonathan M., Roach, Brian, & Codur, Anne-Marie. (2015). *The Economics of Global Climate Change*. US: Global Development And Environment Institute, Tufts University.

IMHEN, Vietnam Institute of Meteorology Hydrology and Environment. (2010). *Climate change and its impact on Vietnam*. Hanoi: Science and Technics Publishing House.

IMHEN, Vietnam Institute of Meteorology Hydrology and Environment. (2011). *Instruction document assessing impact of climate change and identifying adaptation solution*. Hanoi: Vietnam Publishing House of Natural resources, Environment and Cartography.

Le Thu Hoa. (2007). *Regional Economy in Vietnam - From theory to practice*. Hanoi: Labour and Social Publishing House.

Mendelsohn, Robert. (2009). Climate Change and Economic Growth (Vol. Working Paper No 60). World Bank: Commission on Growth and Development.



MONRE, Ministry of natural resources and environment. (2012a). *Climate change and sea level rise scenario for Vietnam*. Hà Nội: Vietnam Publishing House of Natural resources, Environment and Cartography.

MONRE, Ministry of natural resources and environment. (2012b). *Environment Report of Vietnam*.

Nguyen Hoang Dan. (2014). Forecasting the impact of sea level rise and salinity intrusion according to climate change scenarios on rice cultivation in the Mekong Delta. *Science and Technology Journal of Agriculture and Rural Development*, 1(11), 9-16.

Nguyen Van Nam, & Ngo Thang Loi. (2010). *Policy on sustainable development of key economic regions in Vietnam*. Hanoi: Information and Communications Publishing House.

Prime Minister. (2009). *Decision No. 492 / QĐ-TTg dated 16 April 2009 approving the project Establishment of key economic region in the Mekong River Delta*. Hanoi.

Stern, Nicholas. (2006). *Stern Review on the Economics of Climate Change*. Cambridge, UK: Cambridge University Press.

Ta Dinh Thi. (2007). *Economic restructuring on the viewpoint of sustainable development of the northern key economic region*. (Luận án tiến sĩ).

UNDP, United Nations Development Programme, & VASS, Viet Nam Academy of Social Sciences. (2016). *Growth that works for all, Viet Nam Human Development Report 2015 on inclusive growth*.

World Bank. (2007). *The Impact of Sea Level Rise on Developing Countries, A Comparative Analysis (Vol. Policy Research Working Papers)*. Washington, DC.