

# **SOCIO-ECONOMIC VULNERABILITY TO CLIMATE CHANGE: IMPACT ASSESSMENT ON AQUACULTURE FARMERS IN SARAWAK, MALAYSIA.**

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Since the past two decades, the climate projection has revealed the occurrence of climate change by the extreme warming trends of the mean surface temperature. Malaysia has experienced the highest mean surface temperature in 1997 and 1998 and the frequent El-Nino Southern Oscillation (ENSO) events. These scenarios have influence to the abnormal patterns of precipitation and also increase the droughts, storms and floods in some areas and states including Sarawak. Besides the physical and financial drivers, climate is a major driver that enhances the aquaculture sector growth and sustainability. The variability of temperature, air humidity and total rainfall in Sarawak shows negative signs to aquaculture production in both ponds and cages systems. Moreover, the climate change also degrades the water source quality for aquaculture activities such as rivers and water spring where the problems of water stratification and decrease of dissolved oxygen affects aquaculture activities. These problems have contributed to major loss of production and increase in the socio-economic and income vulnerability among farmers. The small scale or individual farmers are among the highest vulnerable to climate change. With the low assets-owned, they are unable to cope with the impacts with their income falling below the national poverty line. Thus, this study attempts to assess the consequences of climate change to aquaculture farmers in Sarawak based on environment and poverty linkages as well as vulnerability and adaptation framework. The impacts and implication of climate change and the strategies by the farmers in coping with the impacts will be discussed further in this paper.

Keywords: climate change, aquaculture, impacts, vulnerability, socio-economic.

## **Overview of aquaculture sector development in Malaysia.**

Aquaculture sector had been developed since 1920's in Malaysia started with the freshwater aquaculture and then brackish water aquaculture in the late 1930. The brackish water aquaculture on that time situated in the mangrove area and concentrated on the shrimp farming by using trapping ponds and also cockle culture in mud flats. The cages aquaculture sector is started around seventies (Tan,1998). This sector has significantly expanded in the last two decades.

Aquaculture sector has a great potential to be developed and play a significant role to overcome the decreasing of fish stock due to over exploitation fishing activities in coastal area by the commercial fishery (Tan, 1998; CICS, 2000). According to Shariff et. al. (1997), aquaculture sector has been transform greatly to more technological activities and drive to the high market contribution. Aquaculture has been identified has the strategic industry to fulfill the domestic demand of high protein resources and export demand of fish products. This will help the government to achieve the growth of food production for 33.4 percent or 1.8 million metric tonnes for fisheries and accomplish 103% in self sufficiency level by 2010 as mentioned in mid-term review of the Ninth Malaysia Plan (Malaysia, 2008). The aquaculture sector benefits the national and local level by perform the demand for fish and endorse the private sector technical and research capability for the economic development (CICS, 2000).