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## CONCEPT PAPER FOR LRGS

Ecological and Evolutionary Responses to Recent Climate Change on Faunal Diversity and Aquatic Ecosystems in Malaysian Borneo

### PROGRAMME & PROJECT OVERVIEW

**Niche Area:** Global Warming (Climate Change), ICT, Biodiversity, Biotechnology

**Programme Leader:** Professor Dr. Mohd. Tajuddin Abdullah

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**Project 1: Faunal sandwich, habitat and species risk in terrestrial ecosystems due to climate change**

**Leader:** Professor Dr. Mohd. Tajuddin Abdullah, Zoology & Genetics, UNIMAS

Members: Professor Dr. Mustafa Abdul Rahman, Professor Dr. Fatimah Abang, Professor Dr. Sulaiman Hanapi, Professor Dr. Indraneil Das, Professor Dr. Balbir Singh, Dr. Ramlah Zainuddin, Dr. Yuzine Esa, Dr. Mohd Azlan Jayasilan Abd Gulam Azad, Dr. Aida Shafreena Ahmad Puad, Muhamad Ikhwan Idris, Mohd Ridwan Abd Rahman, Siti Nurlydia bt Sazali, Ratnawati bt Hazali, Mohd Zacaery Khalik, Faisal Ali bAnwarali Khan, Wan Nurainie bt Wan Ismail, Professor Datuk Dr. Abdul Rashid Abdullah, Dr. Poline Bala & Assoc. Prof. Datu Sanib Hj Said of Universiti Malaysia Sarawak (UNIMAS); Professor Emeritus Dato' Dr. Latif Mohamed, Universiti Kebangsaan Malaysia (UKM); Dr. Maklarin Lakim and Mr. Paul Yambun, Sabah Parks (SP)

**Project 2: Effect of climate change on the composition, structure and function of low-lying and aquatic ecosystems in Malaysian Borneo**

**Leader:** Professor Dr. Shabdin Mohd Long, Aquatic Biology, UNIMAS

Members: Professor Dr. Lee Nyanti Chukong, Assoc. Prof. Dr. Othman Bojo, Assoc. Prof. Dr. Norhadi Ismail, Dr. Samsur Mohamad, Dr. Ruhana Hassan, Dr. Siti Akmar Khadijah Ab Rahim, Dr. Khairul Adha Abd Rahim, Dr. Lim Po Teen, Dr. Aazani Mujahid and Mr. Mohd Nasarudin Harith of UNIMAS

**Project 3: Development of Risk Assessment Method of the Impact of Climate Change on Emerging Infectious Diseases of Local Communities in Malaysian Borneo**

**Project Leader:** Professor Dr. Zilfalil Alwi, Universiti Sains Malaysia (USM)

Members: Professor Tan Sri Dr. Mohd Taha Arif, AP Dr. Lela Hj Su'ut, Professor Dr. Balbir Singh, AP Dr. Hairul Azman b Roslan, AP Dr. Awang Ahmad Sallehin Awg Husaini, AP Dr. Cirilo Nolasco Hipolito, Dr. Samuel Lihan, Dr. Lesley Maurice Bilung, Dr. Syafiq Fikri Lee Nung Kion, AP Dr. Ling Teck Yee and Mr. Charlie Laman, UNIMAS; AP Dr. Habsah Hasan, Dr. Nabila Ismail and Dr Siti Suraya USM

**Project 4: Development of Bioinformatics and Ecological Imaging - Biodata Integration, Analysis, Modeling and DNA barcoding**

**Project Leader:** Assoc. Prof. Dr. Amir Feisal Merican bin Aljunid Merican, Universiti Malaya, UM

Members: Professor Dr. Rosli Hashim and Dr. Mohd Rizman Idid, UM; Dr. Mohd Shahir Shamsir, Universiti Teknologi Malaysia, UTM

**Duration:** 5 years (2013 – 2017)

**Estimated budget:** RM12 million

### EXECUTIVE SUMMARY

This scientific investigation proposes to examine the impact of climate change on sensitive species, low-lying habitats and coastal ecosystems in Malaysian Borneo. These ecosystems are high in productivity and vital areas for biodiversity and fishery nurseries that are vital in the food web in Malaysian Borneo (MacKinnon et al., 1998). The sea level rise will have adverse impact and will result in ecological shift, which may affect population and community dynamics. The 2002 IPCC (Intergovernmental Panel on Climate Change) report acknowledged that species diversity and aquatic ecosystem predicted impaction by climate change at the local, regional and global levels.

A multitude of scholarly studies predict adverse ecological effects, projected to be severe, as a result of global climate change (Duarte, 2002; Gardner et al., 2009; Bickford et al., 2010). The effects include, *inter alia*, population declines, shrinking of body sizes, altered communities, to extreme conditions such as tropical cascades, loss of ecosystem services and species extinctions. Although such threats have been expressed before in print (Houghton, 1997; Markham, 1996), studies to gather primary data relevant to the problem have been few and far between in Southeast Asia, especially on Borneo (see Walsh, 1996). One can argue that in the lack of such data, taking informed decisions or proactive measures, becomes challenging.

The novelty of this project is to use indicator organisms that are sensitive to changes in the hydrologic (e.g. fish and anuran amphibians) and thermal patterns (anuran amphibians and highland vertebrates) over a mid-term (ca. 5 years) temporal scale. Time series climatic data and remote sensing geographic data from the Meteorological Department, MACRES, and IPCC, and published historical data on the distribution of selected fauna will be used. The