



UNIVERSITI PUTRA MALAYSIA

***ECONOMIC IMPACT OF CLIMATE CHANGE ON PALM OIL AND PADDY
PRODUCTION IN MALAYSIA***

ZAHID BIN ZAINAL

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**MASTER OF SCIENCE
UNIVERSITI PUTRA MALAYSIA**

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PRODUCTION IN MALAYSIA**

By

ZAHID BIN ZAINAL

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia, in
fulfillment of the requirement of the Degree of Master of Science**

July 2013

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Abstract of the thesis presented to the senate of Universiti Putra Malaysia in fulfillment of the requirement for degree of Master of Science

ECONOMIC IMPACT OF CLIMATE CHANGE ON PALM OIL AND PADDY PRODUCTION IN MALAYSIA

By

ZAHID BIN ZAINAL

July 2013

Chairman: Professor Datuk Mad Nasir Shamsudin, PhD

Faculty: Agriculture

Climate change issues are debated and have heated up to the global stage. Malaysia like other developing countries faces critical issues on global warming which change local climate and threatens agriculture activities. Higher temperatures and erratic rainfall are the most widely climate change indicators known to affect growth of crops. According to IPCC, global temperatures will increase by 1.5°C to 5.8°C by 2100 and challenge sustainability of agricultural sector in future.

The purpose of this study was to investigate economic impact of climate change to oil palm and paddy production in Malaysia. It employed a modified Ricardian model to assess impact of climate change on crop productivity. The impact changes in temperature and rainfall for 31 years period (1980 to 2010) on palm oil and paddy production was successfully determined through time-series regression analysis

based on annual crops production. Besides, the regression output result was interpreted in agronomic perspective. The PRECIS (Providing Regional Climates for Impacts Studies) Regional Climate Modeling System was applied to estimate potential impact on palm oil and paddy net revenue due to long-term changes in climate.

The result shows that temperature and rainfall had significant negative impact to palm oil and paddy production. The total marginal increase of temperature and rainfall resulted in a loss (RM/ha) of about RM31.37, RM47.18 and RM35.92 for Peninsular, Sabah and Sarawak respectively. Meanwhile, the loss in paddy production in Malaysia as a whole is approximately amount to RM312.20. By projection using regional climate modeling system (PRECIS) the palm oil is predicted to lose an average amount of RM444.12, RM294.20, and RM105.62 for Peninsular, Sabah and Sarawak respectively in year 2059. Moreover, paddy will record a loss to RM4583.10 in the same year. Therefore, it is recommended that adaptation and mitigation strategies are needed to minimize adverse effects of climate change on oil palm and paddy production.

Abstrak tesis yang dikemukakan kepada senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk Ijazah Master Sains

**IMPAK EKONOMI TERHADAP PERUBAHAN CUACA KE ATAS
PENGELUARAN MINYAK KELAPA SAWIT DAN PADI DI MALAYSIA**

Oleh

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Isu perubahan iklim sejak kebelakangan ini semakin rancak dibahaskan hingga ke peringkat global. Di negara membangun seperti Malaysia tidak terkecuali dengan isu-isu kritikal berkaitan dengan pemanasan global yang membawa kepada perubahan iklim tempatan. Aktiviti pertanian dikatakan terancam sebagai akibat perubahan iklim ini. Petunjuk perubahan iklim seperti suhu yang lebih tinggi dan hujan yang tidak menentu memberi kesan tertentu pada pertumbuhan tanaman. Menurut IPCC, suhu global akan meningkat sekitar 1.5°C kepada 5.8°C menjelang tahun 2100. Seterusnya, industri pertanian akan menghadapi situasi yang lebih mencabar dalam menangani isu kelestarian pada masa akan datang.

Tujuan kajian ini adalah untuk menyiasat kesan ekonomi akibat perubahan iklim terhadap pengeluaran kelapa sawit dan padi di Malaysia. Kajian ini menggunakan model Ricardian yang diubahsuai dan merupakan pendekatan terkini dalam menilai

kesan perubahan iklim ke atas produktiviti tanaman. Perubahan kesan suhu dan hujan dalam tempoh 30 tahun (1980-2010) ke atas produktiviti pengeluaran kelapa sawit dan padi telah berjaya ditentukan melalui analisis regresi siri masa berdasarkan tanaman pengeluaran tahunan. Hasil keluaran regresi juga ditafsirkan bersama-sama dengan perspektif agronomi. Pemodelan Sistem Iklim Serantau (PRECIS) telah digunakan untuk menganggar potensi impak ke atas pengeluaran minyak sawit dan padi akibat perubahan iklim jangka panjang pada masa akan datang.

Hasil keputusan menunjukkan bahawa suhu dan hujan mempunyai kesan yang negatif yang ketara terhadap pengeluaran kelapa sawit dan padi. Jumlah peningkatan marginal suhu dan hujan menyebabkan kerugian (RM/ha) kira-kira RM31.37, RM47.18 dan RM35.92 masing-masing untuk Semenanjung, Sabah dan Sarawak. Sementara itu, kerugian dalam pengeluaran padi di Malaysia secara keseluruhannya adalah kira-kira berjumlah RM312.20. Unjuran ramalan kerugian menggunakan sistem pemodelan iklim serantau (PRECIS) minyak sawit adalah secara purata (RM/ha) berjumlah RM444.12, RM294.20, dan RM105.62 masing-masing bagi Semenanjung, Sabah dan Sarawak dalam tahun 2059. Sebaliknya, padi diramalkan akan rugi (RM/ha) sekitar bernilai RM4583.10 pada tahun yang sama. Berdasarkan penemuan kajian ini, beberapa strategi dan langkah-langkah adaptasi dan mitigasi boleh diambil dalam usaha untuk meminimumkan kesan buruk akibat perubahan iklim ke atas pengeluaran minyak sawit dan padi pada masa akan datang.

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APPROVAL

I certify that a Thesis Examination Committee has met on (insert the date of viva voce) to conduct the final examination of Zahid Zainal on his thesis entitle”**Economic Impact of Climate Change on Palm Oil and Paddy Production in Malaysia**”in accordance with the Universities and University Collage Act 1971 and the Constitution of the Universiti Putra Malaysia [P.U.(A) 106] 15 March 1998. The committee recommends that the student be awarded the Master of Science.

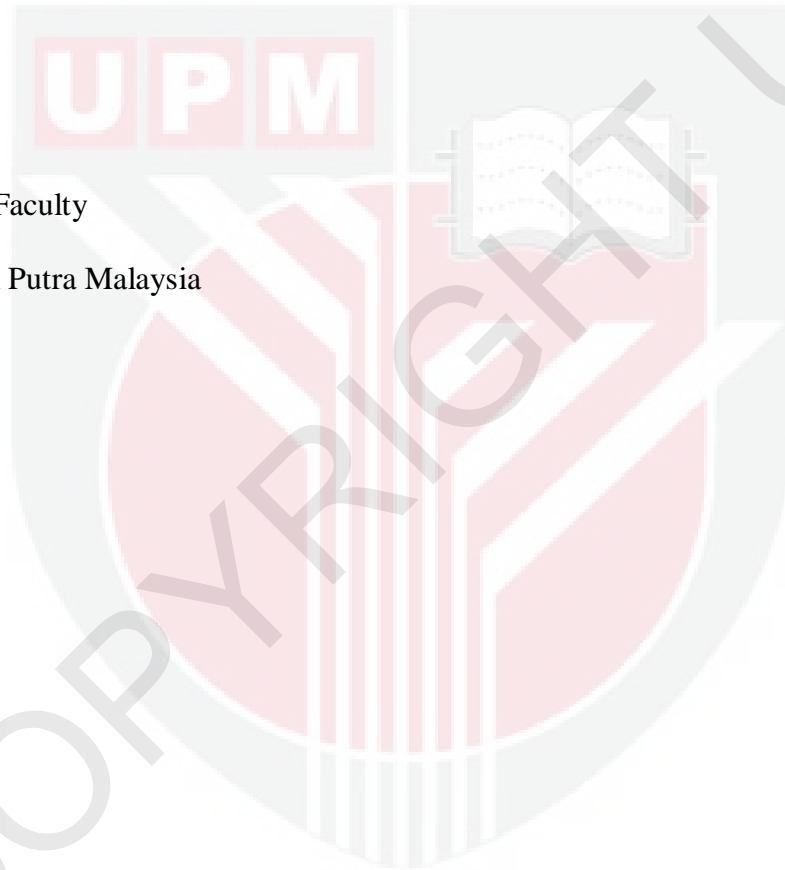
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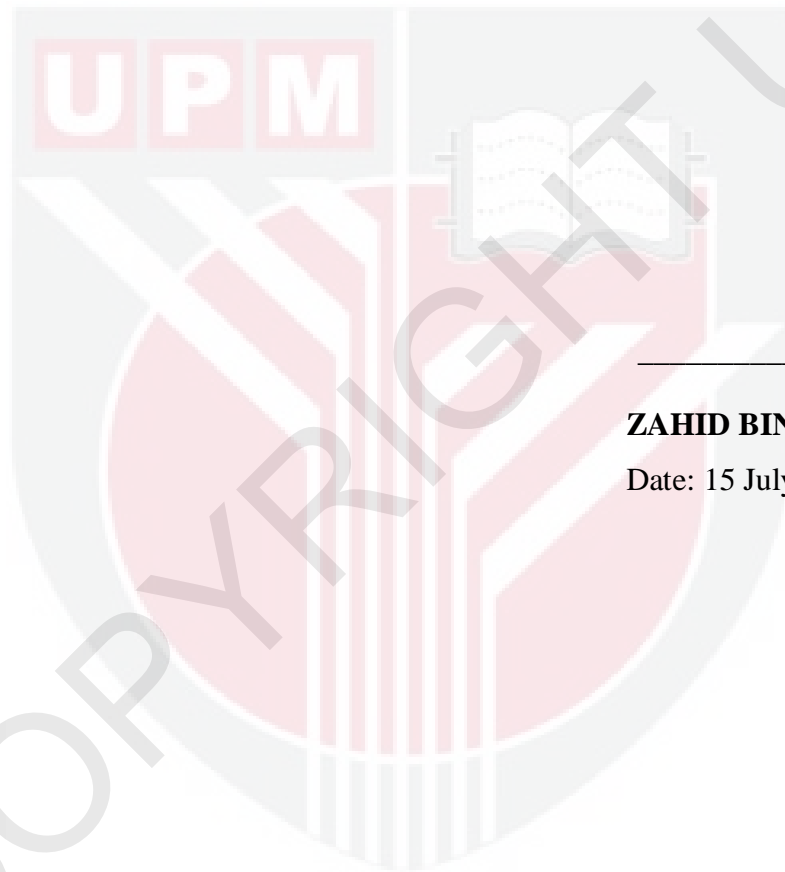
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DECLARATION

I declare that the thesis is my original work except for quotations and citations which have been duly acknowledge. I also declare that it has not been previously, and is not concurrently, submitted for any other degree at Universiti Putra Malaysia or at any other institution.



ZAHID BIN ZAINAL

Date: 15 July 2013

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