ภาคผนวก ก

เอกสารการวิจัยที่เผยแพร่ในการประชุมระดับชาติ และนานาชาติ

การประชุม NRCT – JSPS Joint International Seminar on Coastal Ecosystems in Southeast Asia. Chiang Mai. Thailand. 15-17 November 2013

Reef fish communities at Ko Samed, the Eastern Gulf of Thailand following theoil spill incident

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Oil from the spill of about 50,000 litres of crude in the sea off Rayong Province, the Eastern Gulf of Thailand reachedthe west side of Ko Samed on July 28, 2013. The released oil affected the sandy beach, rocky shores and coral communities. The impacts of the oil spill were assessed using quantitative underwater surveys at several coral communities after the oil spill. The present study aimed to examine abundance and diversity of reef fishes at Ko Samed about one month after the oil spill incident. At least 23 fish species were commonly found at the study sites. Most fishes were in the families Caesionidae, Chaetodontidae, Labridae, Lutjanidae, Nemipteridae, Pempheridae, Pomacentridae and Siganidae. The fish densities varied significantly among trophic groups and study sites. The highest fish density was observed at one of the impacted coral communities. The abundant fish species were *Abudefduf sexfasciatus*, *Caesio cunning*, *Halichoeres nigrescens*,*Lutjanus lutjanus*, *Neopomacentrus azysron*, *Neopomacentrus filamentosus*, *Pempheris oualensis*,*Pomacentrus chrysurus*, *Siganus guttatus* and *S. javus*. This study implies that reef fish communities generally appear high resistant to oil spill impacts. The long-term ecological impacts of the oil spill on reef fish communities, especially during the larval stages and sublethal effects remain to be quantitatively documented.

Keywords: reef fish, oil spill, coral community, abundance, Gulf of Thailand
Oral or Poster Presentation: Poster Presentation
Session: Marine Biodiversity

Name of Presenter: Pitakphong Suantha

16th Japanese Coral Reef Society (JCRS), Japan,22-26 November, 2013

Effects of crude oil spill on coral communities at Ko Samet, Thailand

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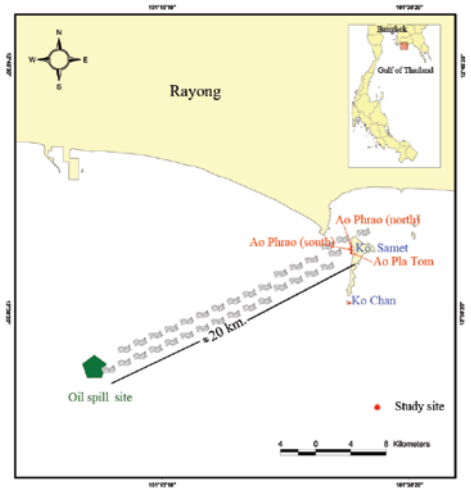
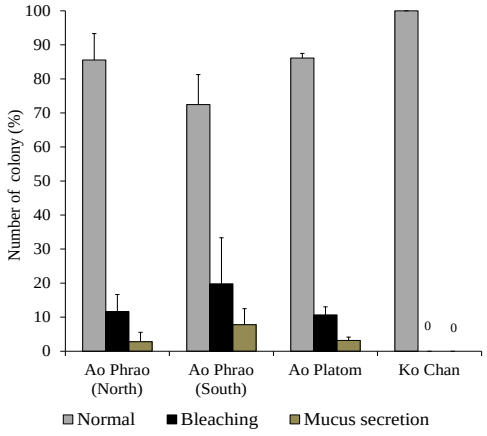
Keywords:oil spill, coral, macrofauna, fish, Thailand

Abstract

Oil pollution is recognized as a threat on coral communities. This study aimed to assess the impacts of a crude oil spill on 27th July 2013, about 50,000 liters, on corals, macrofauna and reef fish at several reef sites on the west coast of Ko Samet, Rayong Province, the Eastern Gulf of Thailand. Sublethal effects on corals were clearly observed. Some colonies of *Porites* spp. showed signs of recent stress, especially bleaching and obvious production of mucus. The impact on corals at Ao Phrao (south) was more severe than other study sites. Several abundant macro-invertebrates on the coral communities, such as a sea urchin *Diadema setosum*, bivalves *Arca ventricosa*, *Beguina semiorbiculata*, *Tridacna crocea*, and a polychaete *Sabellastarte* sp. showed no obvious impacts from the oil spill. The highest fish density was observed at one of the oil spill impacted coral communities. This study implies that reef fish and macrofauna communities generally exhibit high resistant to oil spill impacts. However the long-term ecological impacts of the oil spill on coral communities, particularly during the larval stages and sublethal effects remain to be quantitatively investigated.



Map of the study sites at Ko Samet



Conditions of colonies of *Porites* spp. at the study sites, one month after the oil spill

Oil spill impacts on a sandy beachand a rocky shore

Bleaching of a colony of *Porites* sp.

9th International Scientific Symposium- IOC Sub-Commission for the Western Pacific (WESTPAC), 22 – 25 April, 2014, Nha Trang, Viet Nam

Impacts of a crude oil spill incident on coral communities in the Gulf of Thailand

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Several studies showed that one of the most extreme coastal habitat degradation processes occurs when accidental oils are spilled into the coastal ecosystems, causing many ecological consequences as well as physiological stresses of certain marine animals. Oil pollution is also recognized as a threat on coral communities. This study aimed to assess the impacts of a crude oil spill on 27th July 2013, about 50,000 liters, on corals, macrofauna and reef fish at several reef sites on the west coast of Ko Samet, Rayong Province, the Eastern Gulf of Thailand. Sublethal effects on corals were clearly observed. Some colonies of *Porites* spp. showed signs of recent stress, especially bleaching and obvious production of mucus. The impact on corals at Ao Phrao (south) was more severe than other study sites. Several abundant macro-invertebrates on the coral communities, such as a sea urchin *Diadema setosum*, bivalves *Arca ventricosa*, *Beguina semiorbiculata*, *Tridacna crocea*, and a polychaete *Sabellastarte* sp. showed no obvious impacts from the oil spill. The highest fish density was observed at one of the oil spill impacted coral communities. This study implies that reef fish and macrofauna communities generally exhibit high resistant to oil spill impacts. However the long-term ecological impacts of the oil spill on coral communities, particularly during the larval stages and sublethal effects remain to be quantitatively examined.

Keywords: oil spill, coral, macrofauna, fish, Thailand

Marine Science Conference 2014: Blue Ocean Science. Hat Yai, Songkla Province, Thailand, 23-25 June 2014

การประเมินกลุ่มสิ่งมีชีวิตสัตว์ทะเลหน้าดินขนาดเล็กบริเวณที่ตื้นภายหลังจากเหตุการณ์น้ำมันรั่วไหลในจังหวัดระยอง
Assessing shallow subtidal meiofauna communities following the oil spill incident in Rayong Province

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บทคัดย่อ

สัตว์ทะเลหน้าดินขนาดเล็กเป็นอาหารของผู้บริโภคในลำดับสูงขึ้นของห่วงโซ่อาหาร และมีความอ่อนไหวต่อผลกระทบจากการรบกวนของมนุษย์ มีรายงานการศึกษาที่แสดงให้เห็นว่าสัตว์ทะเลหน้าดินขนาดเล็กเป็นตัวชี้วัดมลพิษทางทะเลได้ดีกว่าสัตว์ทะเลหน้าดินขนาดใหญ่ ผลกระทบของน้ำมันรั่วไหลมีความแปรปรวนตามปัจจัยต่างๆ แต่ผลกระทบในระยะยาวมักมีต่อกลุ่มสิ่งมีชีวิตสัตว์ทะเลหน้าดินขนาดเล็ก การศึกษานี้มีวัตถุประสงค์เพื่อติดตามผลกระทบของการเกิดน้ำมันรั่วไหลที่มีต่อกลุ่มสิ่งมีชีวิตสัตว์ทะเลหน้าดินขนาดเล็กบริเวณแนวปะการังน้ำตื้นหมู่เกาะเสม็ด จังหวัดระยอง (อ่าวไทย) การศึกษานี้พบสัตว์ทะเลหน้าดินขนาดเล็ก12 กลุ่ม โดยกลุ่มเด่น ได้แก่ Sarcomastigophora หนอนตัวกลม ไส้เดือนทะเล หอยสองฝา และ Harpacticoidaความหนาแน่นของ foram มีมากในบริเวณสถานีศึกษาที่ได้รับผลกระทบจากน้ำมันรั่วไหล แต่ความหนาแน่นของหนอนตัวกลมลดลงภายหลังจากการเกิดน้ำมันรั่วไหล โครงสร้างกลุ่มสิ่งมีชีวิตสัตว์ทะเลหน้าดินขนาดเล็กในแต่ละสถานีศึกษามีความสัมพันธ์กับปัจจัยสิ่งแวดล้อมของตะกอน แผนงานการติดตามตรวจสอบในระยะยาวมีความจำเป็นเพื่อตรวจสอบการเปลี่ยนแปลงของกลุ่มสิ่งมีชีวิตสัตว์ทะเลหน้าดินขนาดเล็กที่ได้รับผลกระทบจากเหตุการณ์น้ำมันรั่วไหล

คำสำคัญ: แนวปะการัง, น้ำมันรั่วไหล, สัตว์ทะเลหน้าดินขนาดเล็ก, หนอนตัวกลม, อ่าวไทย

Abstract

Meiofauna provide food for various animals in higher trophic levels and clearly show high sensitivity to anthropogenic influences. They have proved to be more efficient than macrofauna as indicator of marine pollution. The negative impacts of oil spills are very variable, and depend on several factors but long term effects are commonly observed in benthic communities after the spill. The aim of this study was to monitor the impacts of the oil spill incident on shallow subtidal meiofauna communities in coral reefs at Mu Ko Samet, Rayong Province, the Gulf of Thailand. Twelve major taxa were identified and the dominant groups were Sarcomastigophora, Nematoda, Polychaeta, Bivalvia, and Harpacticoida. High densities of forams were found at the oil spill impacted sites while lower densities of nematodes were observed following the oil spill. The meiofauna community structure at each study site could be related to sedimentary parameters. A long-term monitoring program is required to detect the changes in meiofauna communities which were caused by the oil spill incident.

Marine Science Conference 2014: Blue Ocean Science. Hat Yai, Songkla Province, Thailand, 23-25 June 2014

ผลกระทบจากการรั่วไหลของน้ำมันดิบต่อแนวปะการังบริเวณเกาะเสม็ด จังหวัดระยอง
Impacts of crude oil spill on coral reefs at Ko Samet, Rayong Province

วัลยา กลิ่นทอง ธรรมศักดิ์ ยีมิน มาฆมาส สุทธาชีพ สิทธิพร เพ็งสกุล กัญญ์วรา แสงมณี วัชระ สามสุวรรณ์ และพิทักษ์พงษ์ สวนทะ

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บทคัดย่อ

มลพิษจากน้ำมันถือได้ว่าเป็นภัยคุกคามหนึ่งต่อกลุ่มสิ่งมีชีวิตปะการังการศึกษาครั้งนี้มีวัตถุประสงค์เพื่อประเมินผลกระทบที่เกิดจากเหตุการณ์คราบน้ำมันรั่วไหล จำนวนประมาณ 50,000 ลิตร เมื่อวันที่27 กรกฎาคม พ.ศ. 2556 ต่อสัตว์ทะเลหน้าดินขนาดใหญ่ ปะการัง และปลาในแนวปะการังหลายพื้นที่ทางฝั่งตะวันตกของเกาะเสม็ด จังหวัดระยอง บริเวณอ่าวไทยฝั่งตะวันออก พบว่าการรั่วไหลของน้ำมันดิบดังกล่าวทำให้ปะการังอยู่ในภาวะอ่อนแอได้ ปะการังโขด (*Porites* spp.)บางโคโลนีแสดงอาการที่เกิดจากความเครียดโดยเฉพาะอย่างยิ่งจากการฟอกขาวและการผลิตเมือกที่สังเกตได้อย่างชัดเจน ผลกระทบต่อแนวปะการังบริเวณอ่าวพร้าว(ด้านทิศใต้) มีความรุนแรงมากกว่าสถานีศึกษาอื่น ๆ อย่างไรก็ตามเหตุการณ์คราบน้ำมันรั่วไหลดังกล่าว มิได้ก่อให้เกิดผลกระทบต่อสัตว์ทะเลหน้าดินขนาดใหญ่ที่อาศัยอยู่อย่างหนาแน่นในแนวปะการัง เช่น เม่นทะเล*Diadema setosum*หอยสองฝา *Arca ventricosa* , *Beguina semiorbiculata* , *Tridacna crocea* และไส้เดือนทะเล *Sabellastarte*sp. การศึกษาครั้งนี้ชี้ให้เห็นว่าปลาและสัตว์ทะเลหน้าดินขนาดใหญ่ในแนวปะการังมีความทนทานต่อผลกระทบที่เกิดจากเหตุการณ์คราบน้ำมันรั่วไหล อย่างไรก็ตาม ยังมีความจำเป็นต้องดำเนินการสำรวจในเชิงปริมาณเพื่อศึกษาถึงผลกระทบเชิงนิเวศวิทยาระยะยาวที่เกิดจากเหตุการณ์คราบน้ำมันรั่วไหลต่อกลุ่มสิ่งมีชีวิตแนวปะการัง โดยเฉพาะอย่างยิ่งผลกระทบต่อปะการังในช่วงระยะตัวอ่อน รวมถึงผลกระทบต่อสุขภาพปะการังด้วย

คำสำคัญ:คราบน้ำมันรั่วไหลปะการัง สัตว์ทะเลหน้าดินขนาดใหญ่ ปลาจังหวัดระยอง

Abstract

Oil pollution is recognized as a threat on coral communities. This study aimed to assess the impacts of a crude oil spill on 27th July 2013, about 50,000 liters, on corals, macrofauna and reef fish at several reef sites on the west coast of Ko Samet, Rayong Province, the Eastern Gulf of Thailand. Sublethal effects on corals were clearly observed. Some colonies of *Porites* spp. showed signs of recent stress, especially bleaching and obvious production of mucus. The impact on corals at Ao Phrao (south) was more severe than other study sites. Several abundant macro-invertebrates on the coral communities, such as a sea urchin *Diadema setosum*, bivalves *Arca ventricosa*, *Beguina semiorbiculata*, *Tridacna crocea*, and a polychaete *Sabellastarte* sp. showed no obvious impacts from the oil spill. This study implies that reef fish and macrofauna communities generally exhibit high resistant to oil spill impacts. However the long-term ecological impacts of the oil spill on coral communities, particularly during the larval stages and sublethal effects remain to be quantitatively investigated.

Keywords: oil spill, coral, macrofauna, fish, Rayong Province

The 3rd Asia-Pacific Coral Reef Symposium (APCRS 2014). Taiwan, 22-28 June, 2014

Monitoring shallow subtidal meiofauna communities following the oil spill incident in Rayong Province, Thailand

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Meiofauna is a major component of marine benthic ecosystem and its biomass is equal or even higher than macrofauna in shallow coastal areas to deep sea.They provide food for various animals in higher trophic levels and clearly show high sensitivity to anthropogenic influences. Therefore meiofauna can be good environmental indicators. They have proved to be more efficient than macrofauna as indicator of marine pollution. However, most pollution impact studies in marine environment have concentrated on macrobenthic community. The negative impacts of oil spills are very variable, and depend on several factors but long term effects are commonly observed in benthic communities after the spill. The aim of this study was to monitorthe impacts of the oil spill incident on shallow subtidal meiofauna communities in coral reefsat Mu Ko Samet, Rayong Province, Thailand. Three 10 cm long corers with an inner diameter of3.6 cm (sampling surface 10 cm^2) were taken from the oil spill impacted and undisturbed sites. The meiofauna samples were stained with Rose Bengal, sieved through 63 µm mesh net, sorted, identified at a higher taxon level and counted. Twelve major taxa were identified and the dominant groups were Sarcomastigophora, Nematoda, Polychaeta, Bivalvia, and Harpacticoida. High densities of forams were found at the oil spill impacted sites while lower densities of nematodes were observed following the oil spill. The meiofauna community structure at each study site could be related to sedimentary parameters. A long-term monitoring program is required to detect the changes in meiofauna communities which were caused by the oil spill incident.

Keywords: oil spill, meiofauna, foram, coral reef, Thailand
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The 3rd Asia-Pacific Coral Reef Symposium (APCRS 2014). Taiwan, 22-28 June, 2014

Impacts of crude oil spill on coral communities and reef fish at Mu Ko Samet, the Gulf of Thailand

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Oil pollution is an important threat to coastal ecosystems and coral communities at several locations around the world. Oil from the spill of about 50,000 liters of crude in the sea off Rayong Province, the Eastern Gulf of Thailand reached the west side of Ko Samet on July 28, 2013. The present study aimed to assess the impacts of this crude oil spill on corals, macrobenthic animals and reef fish at several reef sites on the west coast of Ko Samet, Rayong Province, the Eastern Gulf of Thailand. Sublethal effects on corals were obviously recorded. Some colonies of *Porites* spp. showed signs of recent stress, especially bleaching and high production of mucus. The impact on corals at Ao Phrao (south) was more severe than other study sites. Several abundant macrobenthic animals on coral communities, such as a sea urchin *Diadema setosum*, bivalves *Arca ventricosa*, *Beguina semiorbiculata*, *Tridacna crocea*, and a polychaete *Sabellastarte* sp. showed no clear impacts from the oil spill. The oil spill impacts on corals were assessed in linking with depth and coral health conditions. Abundance and diversity of reef fish at Ko Samet were examine following the oil spill incident. Over twenty fish species were commonly found at the study sites. Most fishes were in the families Caesionidae, Chaetodontidae, Labridae, Lutjanidae, Nemipteridae, Pempheridae, Pomacentridae and Siganidae. The fish densities varied significantly among trophic groups and study sites. High fish densities were observed at the impacted coral communities. The abundant fish species were *Abudefduf sexfasciatus*, *Caesio cunning, Halichoeres nigrescens*, *Lutjanus lutjanus*, *Neopomacentrus azysron*, *Neopomacentrus filamentosus, Pempheris oualensis*, *Pomacentrus chrysurus*, *Siganus guttatus* and *S. javus*. The long-term ecological impacts of the oil spill on coral communities and reef fish, especially during the larval stages and sublethal effects remain to be quantitatively examined.

Keywords: oil spill, coral community, reef fish, macrobenthic animal, Gulf of Thailand
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the 8th International Crustacean Congress (ICC-8),18 – 23 August, 2014
Frankfurt, Germany

Impacts of the oil spill on crustacean macro-infaunal and meiofaunal communities on coral reefs in the Gulf of Thailand

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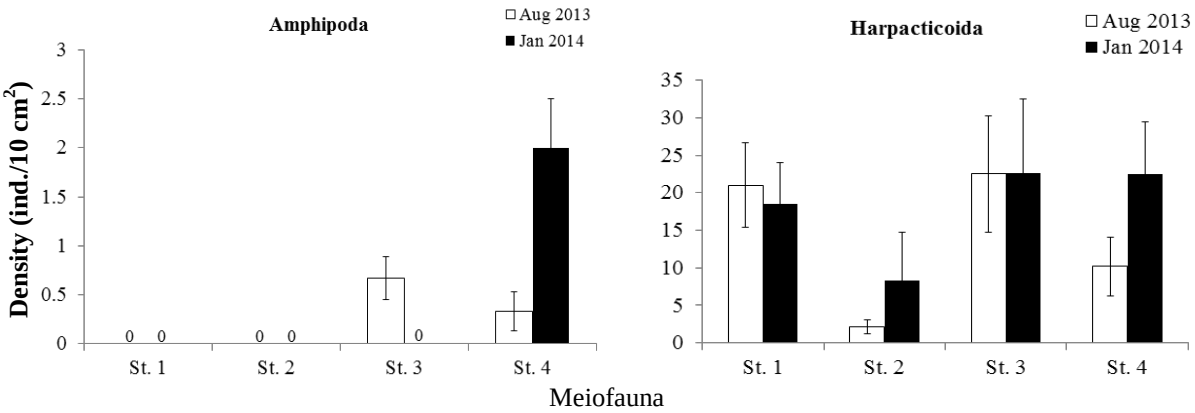
It is recognized that oil pollution is an important threat to coastal ecosystems and coral communities at many locations around the world. Changes in composition and abundance of macrobenthos and meiofauna may be used in order to detect an integrated response to the oil spill incident. Oil from the spill of about 50,000 liters of crude in the sea off Rayong Province, the Eastern Gulf of Thailand reached the west side of Ko Samet on July 28, 2013.The aim of this study was to monitor the impacts of the oil spill incident on shallow subtidal macro-infaunal and meiofaunal communities on coral reefs at Ko Samet. There were four study sites with different oil spill impacts: St.1 (high), St. 2 and St.3 (medium), St. 4 (low). The major groups of crustacean macro-infauna were Amphipoda, Stomatopoda, Brachyura, Caridea, Diogenidae and Cumacea. The crustacean meiofauna included Isopoda, Amphipoda, Harpacticoida, Calanoida and Ostracoda. The effects of the oil spill were clearly observed at St. 1 and St. 2 with the disappearance of the amphipods during the seven months after the spill. There was a very low impact of the oil spill on stomatopods,brachyurans, carideans, diogenids,cumaceansand harpacticoid copepods. It is suggested that long-term monitoring is urgently required to assess the specific effects of oil pollution on the macrobenthic and meiofaunal communitieson soft bottom of coral reefs.



Legend: density of the dominant meiofaunal species in the study area

References:

VEIGA, P., RUBAL, M., BESTEIRO, C. (2009): Shallow sublittoral meiofauna communities and sediment polycyclic aromatichydrocarbons (PAHs) content on the Galician coast (NW Spain), six months after the *Prestige* oil spill. -- Marine Pollution Bulletin **58**: 581–588.

YU, O. H., HYUNG-GON, L., SHIM, W. J. KIM, M., PARK, H. S. (2013): Initial impacts of the *Hebei Spirit* oil spill on the sandy beach macrobenthic community west coast of Korea. -- Marine Pollution Bulletin **70**: 189–196.