AN ANALYSIS OF DAMAGES TO NATURAL RESOURCES: A CASE STUDY OF AO PHRAO, SAMED ISLANDS*

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ABSTRACT

The ecological impact caused by an oil spill is not as straightforward to assess as other kinds of impacts. It can be difficult to evaluate, since marine animals may not be directly killed, but may still suffer from habitat damage or reduced reproduction. This paper will focus on PTTGC's oil spill case and an analysis of damages to natural resources. The problem of how to calculate damages exists on the government entity's side and the judge's side. This paper demonstrates the economic methods that should be applied to identify reasonable damages related to the environment and proposes a summary of methodologies for natural resource damage assessment that the United States of America, Europe, New Zealand, and China use to solve similar problem, in order to identify the proper remedies for oil spillage damage calculation cases in Thailand. The conclusions are as follows:

In Thailand, official reform measures on regulations, guidelines and working mechanisms concerning damage assessment should be proposed and conducted. A Natural Resource Damage Assessment Institution should be established, in order to be responsible for technical and research support, along with the assessment, monitoring, and training process.

The terms "value of natural resources" and "damage" following Section 97 of The Enhancement and Conservation of National Environmental Quality Act of 1992 (NEQA), should be defined in the Act in order to avoid misinterpretation and to make the terms clearer. The scope of coverage of the term "damage" in the NEQA is to "the damage to marine ecosystems, biodiversity, habitat, marine aquatic resources, species distribution and species reproduction" in order to ensure that the interpretation of the court

will cover these areas.

Keywords; Natural Resource Damage Assessment, Damages, Damage to natural resources, PTTGC oil spill, Ao Phrao

บทคัดย่อ

การพิจารณาความเสียหายทางนิเวศวิทยาจากกรณีน้ำมันรั่วนั้นไม่ได้ตรงไปตรงมาอย่างความเสียหายด้านอื่น เนื่องจากมีความยากในการประเมินความเสียหายที่เกิดขึ้น เนื่องจากในบางครั้งไม่ได้มีการสูญเสียสัตว์น้ำ แต่สัตว์น้ำได้รับผลกระทบต่อแหล่งที่อยู่อาศัย และการสืบพันธุ์ เอกสารฉบับนี้มุ่งพิจารณากรณีน้ำมันรั่วที่เกิดจากบริษัทพีทีที โกลบอล เคมิคอล จำกัด (มหาชน) และการกำหนดค่าเสียหายต่อทรัพยากรธรรมชาติ ปัญหาในด้านการพิจารณาค่าเสียหายนั้นคงอยู่ ทั้งในมุมของหน่วยงานของรัฐ และมุมของผู้พิพากษา เอกสารฉบับนี้ชี้ให้เห็นถึงแนวทางทางเศรษฐศาสตร์ที่นำมาใช้ในการกำหนดค่าเสียหายที่เหมาะสมจากผลกระทบที่มีต่อสิ่งแวดล้อม พร้อมทั้งเสนอแนะแนวทางโดยสรุปในเรื่องวิธีการในการพิจารณาค่าเสียหาย อันเกิดจากผลกระทบต่อทรัพยากรธรรมชาติที่นานาประเทศ ทั้งประเทศสหรัฐอเมริกา ยุโรป นิวซีแลนด์ และจีนได้ใช้ในการแก้ปัญหาที่ใกล้เคียงกัน เพื่อที่จะปรับใช้ในการเยียวยา และกำหนด ค่าเสียหายที่มีต่อทรัพยากรธรรมชาติกรณีมลพิษน้ำมันในประเทศไทย ผลสรุปจากการศึกษาในครั้งนี้ มีดังต่อไปนี้

แนวทางในการแก้ปัญหากฎหมายไทยนั้น เห็นควรว่า มีความจำเป็นในการปรับปรุงในเรื่องของกฎ ระเบียบ และหน่วยงานที่ดำเนินการในเรื่องของการพิจารณาค่าเสียหายต่อทรัพยากรธรรมชาติ และเห็นควรให้มีการจัดตั้งสถาบันเฉพาะทางเกี่ยวกับความเสียหายที่เกิดต่อทรัพยากรธรรมชาติ เพื่อทำหน้าที่รับผิดชอบ พร้อมทั้งเป็นผู้เชี่ยวชาญทำงานด้านการวิจัย ร่วมกับการประเมินค่า ติดตามผล และการฝึกอบรมในเรื่องดังกล่าว คำว่า “มูลค่าทั้งหมดของทรัพยากรธรรมชาติ” และ “ทำให้เสียหาย” ตามบทบัญญัติในมาตรา ๙๗ แห่งพระราชบัญญัติส่งเสริมและรักษาคุณภาพสิ่งแวดล้อมแห่งชาติ พ.ศ. ๒๕๓๕ นั้น ไม่ได้มีการกำหนดคำนิยามไว้ในพระราชบัญญัติดังกล่าว ดังนั้น เพื่อเป็นการหลีกเลี่ยงการตีความผิดพลาด และทำให้คำทั้งสองมีความชัดเจนขึ้น ตัวอย่างเช่นขอบเขตของคำว่า “ทำให้เสียหาย” ควรต้องทำให้

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ครอบคลุม และชัดเจนรวมไปถึง “การทำให้เสียหายต่อระบบนิเวศ ความหลากหลายทางชีวภาพ แหล่งที่อยู่อาศัย ทรัพยากรทางทะเล การแพร่กระจาย รวมถึงการกำเนิด และการสืบพันธุ์ของสิ่งมีชีวิต” เพื่อที่จะทำให้การตีความของศาลได้ครอบคลุมถึงความเสียหายในส่วนดังกล่าวด้วย

คำสำคัญ: การกำหนดความเสียหายต่อทรัพยากรธรรมชาติ, การเรียกค่าเสียหาย, ความเสียหายต่อทรัพยากรธรรมชาติ,เหตุการณ์น้ำมันรั่วบริษัทพีทีที โกลบอล เคมิคอล จำกัด (มหาชน) , อ่าวพร้าว

1. INTRODUCTION:

PTT Global Chemical Plc’s oil spill is a major oil spill in Thailand. On July 27, 2013, around 50,000 litres of crude oil leaked from an offshore pipeline operated by PTT Global Chemical (PTTGC) off the coast of Map Ta Phut, Rayong province.

The recent PTTGC oil spill in the Gulf of Thailand has raised important questions: “How to calculate the cost of oil spill damage?” and “Who will bear the cost of environmental damages?”. Surprisingly, there is no legislation specifically addressing on environmental damage assessment and liability for natural resource restoration.

An oil spill is an acute environmental disruption and a disaster to the natural environment. Both people and the State are rarely compensated for the long-term effects of an oil spill because it is difficult to assess the actual damage in an oil spill case.

In Thailand, there are no current specific laws or guidelines that focus on civil liability for damage caused by oil spillage and its environmental damage. The only existing laws which are only partially relevant to oil spills are the Thai Civil and Commercial Code, Acts on Navigation of Thai Waters Act, B.E.2456 (1913) and The Enhancement and Conservation of National Environmental Quality Act, B.E.2535 (NEQA 1992).

2. PROBLEMS OF NATURAL RESOURCE DAMAGE ASSESSMENT IN THAILAND:

Harm to the environment is difficult to assess and highly complex, considering its effects to species and natural habitats. The Thai traditional method of damage calculation for the judge is currently based on the court's discretion. Thailand does not have guidelines for the court of justice, or provisions to lay down the methods, regarding how to evaluate natural resource damages or the methods of calculating the damage to the affected environment. The problem of acceptability and accountability of the valuation methods used in damage assessment of natural resources is the major obstacle for the case, relating to environmental damage or destruction of natural resources in the Thai court.

Natural resource damage assessment is very unorganized and inconsistent in Thailand. The traditional economic valuation approach by counting the death toll of marine life or the use of a single method are not sufficient to deal with natural resource damage assessment in oil spill cases. Oil spill incidents materially affect the well-being, livelihood, body mechanism and reproduction system of marine animals and corals in the affected area. Marine life dies immediately, and after that, people were unable to fish, earn income and enjoy their lives. Despite efforts to remove oil from the surface, adverse effects to the environment and natural resources persist.

3. ECONOMIC METHODS FOR NATURAL RESOURCE DAMAGE ASSESSMENT AND APPLICATION TO AO PHRAO'S OIL SPILL CASE:

Economic analysis is just one of the many different methods used in natural resources damage assessment. Analysis on what method is suitable for damage assessment in Thailand and Ao Phrao's Case is as follows:

1. Market Price or Market Value Approach: Under this method, we will consider the impact of oil spills on the economic

benefits and costs of market goods.[1]Let's take for example, that fish around Koh Samed are seriously injured by an oil spill. The market price can be the first method to be selected in this case, since the primary natural resources affected is aquatic animals, especially fishes that are generally caught for commercial activity. However, this raises the issue of a conserved resource that is prohibited or unable to trade in the market, such as coral reefs. The price of fish can also be increased due to the shortage, imbalance of demand and supply and consumption behavior.

2. Hedonic Pricing Method: The hedonic pricing method is used to estimate the economic values for natural resources or ecosystem, by considering their impact on market goods. [2] However, this method is mostly "applied to variations in housing prices that reflect the value of local environmental attributes."[3] The selling price of hotels in the location of the contaminated site, would be lower than the non-affected area, due to the quality of the environment.

3. Production Function Method or Productivity Method: The productivity method is applied in cases where natural resources are used to produce goods in the market, by considering their contribution in the production of goods.[4] In cases where pollution affects quality of water, the cost of irrigation or purification will be higher. Due to the above, this method might be difficult to apply to this oil spill's case, since it is too complex to assess.

4. Travel Cost Method: This method can be applied by measuring the economic benefits of the natural resources, or how

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[1] Uddin Sarwar Ahmed & Keinosuke Gotoh, **Cost-Benefit Analysis of Environmental Goods by Applying Contingent Valuation Method**, (Tokyo: Springer, 2002) 9

[2] Ece Ozdemiroglu, **Resource Equivalency Methods for Assessing Environmental Damage in the EU**, Remede conference, June 3, 2008

[3] Ahmed & Gotoh, *supra* note 1

[4] Christopher M. Fleming & Averil Cook, "*The Recreational Value of Lake McKenzie: An Application of the Travel Cost Method*", The 51st Annual Conference of the Australian Agricultural and Resource Economics Society, Queenstown, 2007

much people are willing to pay to travel in the site. "Entry Ticket fees, on-site-expenditures, amount of travel time spent and/or the opportunity cost of travel time, and fuel costs" can be all considered as "Travel costs". [5] After processing by an economist, the demand curve and the consumer surplus would be shown, and the value of Ao Phrao could then be processed and revealed under this method.

5. Contingent Valuation Method (CVM): This method uses survey to determine the willingness to pay, or the willingness to accept, for goods and services. [6] This method can measure both the use and the non-use values of natural resources. The public determines the values of the natural resources via the surveys, and that value later becomes a monetary amount. In order to measure the value of natural resources, surveys under this method would provide information to create a better understanding to respondents as follows:

- Photos of marine lives which were killed by the spill;

- Comparison photos of the area from before the oil spill, to after the oil spill;

- A satellite photo or map identifying the area of the oil slick;

- A chart comparing pre-spill estimation and post-spill estimation of fishes, shellfishes, crabs.

6. Contingent Choice Method: Under this method, respondents will be asked to make a decision or single choice based on a simulation. The major difference compared to the Contingent Valuation Method, is that the respondents will not state the value

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[5] Mark Christensen, "*Valuation of Natural Assets under the Resource Management Act*", http://www.andersonlloyd.co.nz/wp-content/uploads/2013/08/Valuation-of-Natural-Assets.pdf (accessed on July 14, 2015)

[6] Edward H.P. Brans, **Liability for Damage to Public Natural Resources Standing, Damage and Damage assessment**, (n.p.: Kluwer International, 2001), 154

amount clearly in Contingent Choice Method.[7] The choice they make will be applied to determine the value of natural resources.

7. The Restoration - Based Approach/Habitat Equivalency Analysis (HEA): This method is used by the National Oceanic and Atmospheric Association to claim damages against parties responsible for natural resource damage resulting from oil spill incidents.[8] It is applied by comparing the service or lost services that the ecosystem provides, to the biotic component in Ao Phrao's case.

4. COMPARATIVE STUDY:

This paper explores how the U.S.A., European Union, China and New Zealand handle natural resource damage assessment. Any existing laws in Thailand, which are only partially relevant to oil spills, are the Thai Civil and Commercial Code, The Acts on Navigation of Thai Waters Act, B.E.2456 (1913), and The Enhancement and Conservation of National Environmental Quality Act, B.E.2535 (NEQA 1992). Given the extreme consequences and costs involved with oil spills, it is necessary to have rules or specific guidelines concerning natural resource damage assessment.

Economic methods of natural resource damage assessment are widespread among many countries, except Thailand. In respect to the economic analysis of damage calculation and legal implementation, economic methods or theories can give useful ideas to be applied in the Thai legal system and practices.

The valuable experiences of the U.S.A., in terms of NRDA, have been extensively studied and pave the way for other

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[7] Dennis M. King, Marisa Mazzotta, "*Contingent Choice Method*", http://www.ecosystemvaluation.org/uses.htm (accessed on October 10, 2014)

[8] The Under Secretary for Oceans and Atmosphere (NOAA Administrator) acts on behalf of the Secretary of Commerce as a Federal trustee for natural resources under the Act CERCLA (42 U.S.C. § 9601 *et seq*.), the Clean Water Act (33 U.S.C. § 1251 *et seq*.), the National Marine Sanctuaries Act (16 U.S.C. § 1431 *et seq*.), and the 1990 Oil Pollution Act ("OPA"; 33 U.S.C. § 2701 *et seq*.).

countries in the world. The USA has applied several economic methods to the oil spillage cases. In the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the Oil Pollution Act (OPA) of the U.S.A., the definitions of Natural Resource Damage Assessment are closely similar.[9] The amount of damages refers to the amount and cost to restore the injured natural resources to baseline condition. Similar to the CERCLA, the OPA guarantees the right of states to perform the duty as trustees in order to protect and preserve natural resources and to recover damages for injury to natural resources.[10] The trustees can choose which method should be applied and deemed appropriate for damage assessment.[11]

The damage schedule is an alternate method of valuing environmental damage. The designed schedule is derived from the assessment of community preferences with respect to changes in natural resource value. [12] The damage schedule approach has been proposed in Washington and Florida, in which they implement their own rules and regulations for damage assessment. A compensation schedule is defined as "the set of procedures enumerated in Washington Administrative Code (WAC) 173-183-300 through 173-183-870 to determine the public resource damages resulting from an oil spill for cases in which damages are not quantifiable at a reasonable cost."[13] Florida also enacted their own compensation schedule which is used for assessment of damage caused by small discharges, that is to say 25 to 30,000 gallons.[14] Section 376.121 of the 2015 Florida Statutes defines the rule about the Florida Compensation schedule, in order to decrease unnecessary delay and expense in determining the values of damage to the state's natural

[9] CERCLA §101(16) and OPA §1001(20)
[10] CERCLA 42 U.S.C. §9607(f); OPA 33 U.S.C. §2702 (b)
[11] Edward, *supra* note 6 at 50
[12] Ratana Chuenpagdee, Jack L. Knetsch and Thomas C. Brown, "*Environmental Damage Schedules:Community Judgments of Importance and Assessment of Losses*", 1
[13] WAC 173-183-100
[14] Edward, *supra* note 6 at 170

resources.[15]

China has established a Judicial Authentication Management System. The Judicial Authentication in China allows expert witness to apply science, specific methods, specialized skill, and past experiences to test, authenticate, and identify damage to an environment. Various methods for a calculation system in China, apart from similar methods under the U.S. legal system, have been recognized, such as the statistical estimation method, the production effect method, the simulation experimental method, the fish eggs and larvae estimation method, and other interesting methods, which could be very useful.

Under the European Union White Paper, the term "damage" is clearly identified as environmental damage, which includes: Damage to biodiversity, Damage in the form of contamination of sites, and traditional damage. However, Thailand does not have a Directive that provides the scope of damages. The White Paper does not provide an indication of what is the appropriate restoration measure, [16] and does not give much detail as to which conditions each method will use, and can cause difficulty in providing an appropriate solution.

In New Zealand, no laws or guidelines are directly concerned with methods of natural resource damage assessment, and this characteristic is closely similar to the Thai system. According to the primary research, the economic valuation on a natural resource is concluded as an important aspect to consider under the Resource Management Act 1991 (RMA). However, non-market valuation approaches have been applied by those in charge of environmental valuation in policy planning in New Zealand. [17]

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[15] FLA STAT § 376.121

[16] Michael Bowman and Alan Boyle, **Environmental Damage in International and Comparative Law Problems of Definition and Valuation**, (n.p.: Oxford University Press, 2002), 328

[17] New Zealand Institute of Economic Research (NZIER), "*Valuing Natural Assets*", NZIER Working Paper 2013-03, Wellington, May 2013

5. PROPOSED SOLUTIONS

(a) Firstly, the term "value of natural resources" following Section 97 of The Enhancement and Conservation of National Environmental Quality Act of 1992 (NEQA)[18] should be defined in the Act. When the term "value of natural resources" is not clearly defined, it may lead to various interpretations.

In the author's opinion, the "total value" of natural resources destroyed, lost or damaged by an unlawful act or omission under NEQA should be defined to include both Direct Use Value and Indirect Use Value, as widely accepted in foreign countries. The value of natural resources is not simply limited to "Consumptive Use Value", and the total value is not limited to only the "Use value". Both the Use Value and Non-Use Value can be considered in the value of natural resources. However, only the Use Value (both Direct Use Value and Indirect Use Value) should be taken into account for the total economic value calculation for natural resource damage assessment in Thailand, since the application of Non-Use value is hard to achieve without controversy. This is beyond the scope that can be accepted in Thailand.

(b) The NEQA1992 does not provide the definition of "damage to natural resources". It is unclear if damage to natural resources extends to "functional (service) damage". It is also interesting that in many cases, the pollution also contributes to the decrease of birthrates, as a consequence of adverse effects on reproduction systems.

In the author's opinion, the definition of "damage" in Section 97 of the NEQA should be specified as "the damage to marine ecosystems, biodiversity, habitat, marine aquatic resources, species distribution and species reproduction and/or other damage

[18] Section 97 of The Enhancement and Conservation of National Environmental Quality Act of 1992 "Any person who commits an unlawful act or omission by whatever means resulting in the destruction, loss or damage to natural resources owned by the State or belonging to the public domain shall be liable to make compensation to the State representing the total value of natural resources so destroyed, lost or damaged by such an unlawful act or omission."

that is considered appropriate".

The author has an opinion to include the above mentioned definitions in NEQA because the NEQA is a specific law which deals with pollution. The term "damage" is not easily defined in the Thai Civil and Commercial code because it relates to personal injuries, property damage and other areas.

(c) Since there are no specific regulations or guidelines dealing with civil liability of oil spills, which can provide a model to calculate the damage and how to assess environmental damage, the improvement of standards for environmental impact assessment mechanisms is highly called for.

In reality, the process of passing laws takes a longer time than the guidelines. If a specific law is too difficult to enact, the author suggests issuing "Guidelines on how to calculate environmental damages" by the Court of Justice.

Guidelines on how to calculate environmental damages by the Court of Justice should be implemented to visualize and avoid obstacles in determining injuries and assessing damages for judges sitting in environmental cases. The application of economic valuation analysis for natural resource damage assessment does not aim to overrule the discretionary power of judges. Judges will have the full independent right to decide on these cases.

(d) The application of interesting methods from other countries in the Thai compensation system would be a good solution in oil spill cases. In China, there are various types of methods provided by the Ministry of Agriculture: for example, the Direct calculation method, the Comparative method, the Site-specific harvesting method, the Corralling statistical method, the Statistical estimation method, the Survey statistical method, the Simulation experimental method, the Production effect method, the Production

statistical method, the Expert assessment method, the Fish eggs and larvae estimation method, and other methods as stated earlier.[19]

(e) The process of natural resource damages assessment should be clearly specified under the laws or regulations as well. Government agencies spend a lot of time, which causes a delay in performing their duty of natural resource damage assessment. This problem is caused by the lack of a clear damage assessment methodology in the laws or regulations. Many developed countries, such as the U.S.A., have set up compensation systems which comprise of these areas: the scope of compensation to environmental pollution, steps of damage assessment, investigation reports, public participation, and guidelines by the Court of Justice to award damage in the environmental cases. They also set up an administrative agency to study and develop calculation methods.

(f) A Natural Resource Damage Assessment Institution should be established to be responsible for technical and research support, together with the assessment, monitoring, and training process. This institution should include economists, ecologists, scientists, and legal officers. Because of their understanding of biology, ecologists can work with economists to help trustees to deal with Natural Resource Damage Assessment cases.

In other countries like China, the configuration of assessment agencies are also established to deal with environmental damage assessment. In China, the local agencies have been set up to deal with environmental damage assessment. It would be ideal to have this kind of organization in Thailand. Thailand should set up an agency or a commission which can be considered an administrative agency, mainly responsible for natural resource assessment and what quantity of oil spillage impacts the ecology.

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[19] EU-China Environmental Governance Programme, "*General situation of legislation and practice of environmental damage assessment and compensation*", April 2014**,** 8

(g) A limitation of time for the government agency to complete the process of natural resource damage assessment should be amended from ten years (the general limitation of time), to two years. The claim should be submitted in the court to challenge natural resource damages within two years, because the money that the state will receive as damages can be used for the restoration and recovery of damage to natural resources. Ten years may be too late to recover damage to natural resource.

(h) Support for more environmental research by government authorities, and the development of valuation standards should be enacted. For example, seawater quality tests can show the level of petroleum hydrocarbon and mercury of seawater, to determine the oil spill's impacts on marine and coastal ecology. This empowers judges and government officers to understand the impact and helps them make a decision. For instance, judges can simply use information from research of silt in seawater or marine animals in Ao Phrao area to compare the level of hydrocarbon in silt before and after an oil spill.

6. CONCLUSION

The terms “value of natural resources” and “damage” under Section 97 of The Enhancement and Conservation of National Environmental Quality Act of 1992 (NEQA) should be defined in the Act. The benefit of adding the definition of “damage” in the NEQA is to cover damage to diversity, habitat, marine aquatic resources, species distribution, species reproduction, and other types of damage. Under the terms specified above, the damage to the habitat and reproduction systems of marine aquatic resources are included. The “total value” of natural resources destroyed, lost or damaged by an unlawful act or omission under NEQA should be defined to include both Direct Use Value and Indirect Use Value.

Different kinds of damage assessment methods should be applied in practice to generate an estimate of damage or monetary value of destroyed resources in oil spill cases in Thailand.

Without the guidelines or guidance, it will be difficult for authorities to handle damage assessment. To conclude, due to the severe harm to natural resources resulting from a spill, it is necessary to have specific guidelines and/or effective provisions, in order to have a legal framework for the concerning authorities to deal with an analysis of damages to natural resources caused by an oil spill, measures focused on assessment, working mechanisms, and remedies for oil spillage cases in the future.

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