

# Comparing Dutch and Chinese marine conservation

*Differences in marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China*



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*Differences in marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China*

Final thesis of Coastal Zone Management

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## Executive summary

Kust en Zee (Dutch part of EUCC (Coastal and Marine Union in Europe)) wants to introduce pingers to Chinese fishermen to reduce cetacean bycatch in Chinese fishery. It is as a ‘daughter project’ in China, corresponding to the pilot project of the Dolphin Saver project which targeted on Dutch fishermen. This idea is based on the knowledge which Kust en Zee has of marine conservation awareness in the Netherlands. However, marine conservation awareness, including which towards cetacean bycatch, in China is different from the Netherlands. Kust en Zee has not had an accurate knowledge of the current situation of marine conservation in China before planning to implement a project on marine conservation - the Dolphin Saver project, in China, thus comes this unexpected situation. This problem shows that it is crucial to have a good view of the current situation of marine conservation in China, especially the differences in the current situation of marine conservation between the Netherlands and China for Dutch NGOs, before starting any project on marine conservation in China. Therefore, this research is to show the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China.

All the data in this research is collected from open resources – the Internet, through keyword searching on websites. All the differences in marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China are find out through comparing the corresponding facts of these four aspects in 4 tables (see Appendix II).

The main research question of this research is: What are the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China? It is based on the following sub-questions: 1. What are the differences in the current situation of marine species protection between the Netherlands and China? 2. What are the differences in the current situation of marine habitat protection between the Netherlands and China? 3. What are the differences in the current situation of bycatch between the Netherlands and China? 4. What are the differences in the current situation of marine conservation awareness between the Netherlands and China?

In the current situation of marine species protection between the Netherlands and China, the law on the prevention of alien marine species in import and export trades in China is Import and Export Animal and Plant Quarantine Law. There is no law on for the prevention of alien marine species in import and export trades in the Netherlands. Therefore, the law on the prevention of alien marine species in import and export trades in China is different than the Netherlands. No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to compare with China. No information whether the protection plans for the endangered and Red List marine species are adequate or not, in the Netherlands has been found to compare with China. No information on legal system of legislation and policies which are related to species protection in the Netherlands has been found to compare with China. No information on provincial compensation policy, which is special for species preservation, or the implementation of legislations and policies on marine species protection in China has been found to compare with the Netherlands. In the Netherlands all native marine species are protected and included in the database. In China, only endangered marine species are protected and included in the database. Therefore, the coverage of protected marine species and corresponding database is different in the Netherlands than China. No article on the punish-

ment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to compare with China. No big difference in the regulations on the protection of marine species between the Netherlands and China has been found. The activities which harm protected marine species are prohibited in both the Netherlands and China. No information on what aspect has to be in ecological impact assessment in China has been found to compare with the Netherlands. No information whether the researches of marine ecosystems meet the requirements of marine conservation, or not, in the Netherlands has been found to compare with China. There are areas which are permanently closed to fishing in the Netherlands. Only in the summer closed fishing season, there are areas which are closed to fishing in China. Therefore, the level of the protection of from marine species fishery is different in the Netherlands than China. No information on the prohibited fishing gears in the Netherlands has been found to compare with China.

In the current situation of marine habitat protection between the Netherlands and China, no big difference of no-take marine nature reserves between the Netherlands and China has been found, since there are no-take marine nature reserves both in Netherlands and China. No marine nature area in National Landscapes in the Netherlands has been found. There are MPAs (multiple-use special marine protected areas) in China. Therefore, the multiple-use special marine protected areas are different in the Netherlands than China. No information on the implementation of legislations and policies on marine habitat protection in the Netherlands has been found to compare with China. No enough figures on the MPAs in the Netherlands have been found to compare with China. In the Netherlands, Nature Conservation Act is special for the protection of habitats, including marine habitats. Marine Environment Protection Law, the most important law on marine habitat protection in China, is mostly about the pollution of marine environment. Marine habitat protection is only a small part of it. Therefore, the focus of the law which is related to marine habitat protection is different in the Netherlands than China. No big difference in the regulations and policies on no-take marine nature reserves between the Netherlands and China has been found. There are legal systems and policies on marine nature reserves in both the Netherlands and China. No legislation or policy on National Park in China has been found to compare with the Netherlands. No marine nature area in National Landscapes in the Netherlands has been found for the comparison of relevant legislation or policy with 'Interim Rule of Special Marine Protected Areas' in China. No information on the punishment of damaging protected marine nature areas in the Netherlands has been found to compare with China. No big difference in the requirements of preservation of protected marine nature reserves between the Netherlands and China has been found. Activities which harm marine nature reserves are prohibited in both the Netherlands and China. No information on the establishment of marine protected areas in the Netherlands has been found to compare with China. No information on conservation objectives of MNRs or the management of National Parks in China has been found to compare with the Netherlands. No enough information on the problems in the management of marine nature reserve has been found in the Netherlands to compare with China. No information on the monitoring and evaluation of marine protected areas in the Netherlands has been found to compare with China. There are databases of different types of marine natures in the Netherlands. No database of MPAs in China has been found. Therefore, the database of marine nature reserves is different in the Netherlands than China. There is physical compensation in Green Space Structure Plan in the Netherlands. No physical compensation in China. Therefore, nature compensation is different in the Netherlands than China. No information on the problems of legislations, law enforcement of marine conservation, or the education of marine biodiversity and conservation in the Netherlands has been found to compare with China.

In the current situation of bycatch between the Netherlands and China, no big difference in the legislations or policies on bycatch between the Netherlands and China has been found, since there are legislations and policies on monitoring and data collecting both in the Netherlands and China. No provincial regulation on fishing discard or on turtle bycatch in the Netherlands has been found. In Dutch fisheries, cetacean bycatch species - Harbour Porpoise (*Phocoena phocoena*), Grey Seal (*Halichoerus grypus*), Short-beaked Common Dolphin (*Delphinus delphis*), and Atlantic White-sided Dolphin (*Lagenorynchus acutus*), are under the category of 'Least Concern' on the IUCN Red List. In Chinese fisheries, cetacean bycatch species - Finless porpoise (*Neophocaena phocaenoides*), is under the category of 'Vulnerable'; and Chinese white dolphin (*Sousa chinensis*), 'Near Threatened' on the IUCN Red List. Therefore, the conservation statuses of cetacean bycatch species are different in Dutch fisheries than Chinese fisheries. There is lack of figures of the quantity of invertebrates and fish bycatch in Dutch fisheries to compare with Chinese fisheries. There are extreme high ratios of discards in Dutch fisheries. There is very little discard in Chinese fisheries. Therefore, the quantities of the discards are different in Dutch fishery than Chinese fishery. No information on seabird, shark or sea turtle bycatch in the Netherlands has been found to compare with China. No big difference in the impact of bycatch on marine ecosystems between the Netherlands and China has been found, since there are big impact of bycatch on marine ecosystems both in the Netherlands and China.

In the current situation of marine conservation awareness between the Netherlands and China, There are projects on cetacean bycatch reduction, like the Dolphin Saver project from Kust en Zee, and sustainable fishery, like campaign 'Sustainable seafood on the menu' from WWF Netherlands and the Royal Restaurant Association, Goede VIS project and the Fish Guide from the North Sea Foundation in the Netherlands. No project on cetacean bycatch reduction or sustainable fishery from NGOs in China has been found. Therefore the awareness of NGOs on cetacean bycatch reduction and sustainable fishery in the Netherlands is different from China. Seafood consumers in the Netherlands are aware of the impact of turtle and dolphin bycatch, and want to contribute to sustainable fishery by purchasing 'Green Fish', such as 'dolphin safe' tuna. This fact reflects the attitude of the public in the Netherlands towards sustainable fishery. In China, the public is not aware that shark fishing is illegal, and supports it; the public regards whaling good, and support it. These two facts reflect the attitude of the public in China towards sustainable fishery. Therefore, the attitude of the public towards sustainable fishery in the Netherlands is different from China. No information on Chinese retailers which are involved in the sale of MSC labelled fish products has been found to compare with the Netherlands. No information on the awareness of fishermen or local communities on the regulations of marine protected areas, or the awareness of the public on the function and performance of protected areas in the Netherlands has been found to compare with China. Many Dutch fisheries, exporters and processors in the Netherlands have achieved MSC certification. There is no MSC certified Chinese fishery. Therefore, the attitudes of the stakeholders of Dutch fishery towards MSC certification programme are different than which of Chinese fishery. The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on cetacean bycatch to compare with the attitudes of Chinese fishermen on cetacean bycatch. No information on the attitude of Dutch fishermen on sea turtle bycatch has been found to compare with Chinese fishermen. The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on sustainable fishery to compare with the attitudes of Chinese fishermen on sustainable fishery.

In conclusion, the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China are: the coverage of protected marine species, as well as in corresponding databases, the level of protection of marine species from fishery, the multiple-use special marine protected areas, the focus of the law, which is related to marine habitat protection, and nature compensation are different in the Netherlands than China. The conservation statuses of cetacean bycatch species and the quantities of the discards are different in Dutch fishery than Chinese fishery. The awareness of NGOs on cetacean bycatch reduction and sustainable fishery, the attitude of the public towards sustainable fishery, and the attitudes of fishery stakeholders towards MSC certification programme in the Netherlands are different from China.

It is not the best time to introduce pingers to Chinese fishermen at this moment, due to that there is lack of a similar background in China unlike the Netherlands to support the idea of introducing pingers to Chinese fishermen. Before starting any project on marine conservation in China, it is necessary to be aware of all the differences which are presented in the conclusion.

Based on the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China, 7 action points - the possibilities to improve the current situation of marine conservation in China, are given (see the columns 'Action points' of 4 tables in Appendix II). The last 3 action points, which are for raising marine conservation awareness in China, are recommended to take: (1) Raising the awareness of the public on the impact of bycatch and overfishing on marine ecosystems in China. It might be helpful to cooperate with NGOs such as WWF China, Greenpeace China or Friends of Nature China, or mainstream media, such as CCTV (China Central Television), due to that the issues, which have been broadcasted in the programmes 'Hot issue interviews' (CCTV, 2010a) and 'News investigations' (CCTV, 2010b) on News channel of CCTV, have attracted much attention in the whole country. Environmental Protection channel (CCTV, 2010c) of CCTV is special on environmental protection or nature conservation issues. (2) Developing projects on cetacean bycatch reduction and sustainable fishery with NGOs in China from the experiences in the Netherlands. (3) MSC certifying Chinese fisheries. The other 4 action points, which concern species and habitat protection, are much more difficult to succeed than proceeding 2 action points, due to the limitation of changing legislations and policies in China for international NGOs.

It is necessary for preparing the project on marine conservation in China to consult the Dutch embassy in China on the legislations and policies which are relevant for Dutch NGOs to work in China, such as 'international NGOs are not allowed to work independently in China without connection with local organisations'; and the possibilities of the cooperation with local organisations. Based on the advices on these two aspects from the Dutch embassy in China, a research on the feasibilities of the action points is necessary before starting the project.

## Abstract

Kust en Zee (Dutch part of EUCC (Coastal and Marine Union in Europe)) wants to introduce pingers to Chinese fishermen to reduce cetacean bycatch in Chinese fishery. But it is not the best time to introduce pingers to Chinese fishermen at this moment, due to that there is lack of a similar background in China unlike the Netherlands to support this idea - marine conservation awareness, including which towards cetacean bycatch, of the public and NGOs in China is different from the Netherlands, which the idea is based on. Therefore, it is necessary for organisations in the Netherlands or Europe to be aware of the differences in the current situation of marine conservation between the Netherlands and China before planning any project on marine conservation in China.

This research shows the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness – four main aspects in marine conservation, to reflect the differences in the current situation of marine conservation between the Netherlands and China. All the differences are concluded through 4 comparison tables, where all corresponding facts of four aspects in marine conservation between the Netherlands and China are listed and compared with each other.

All the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China, which are found in this research, are: the coverage of protected marine species, as well as in corresponding databases, the level of protection of marine species from fishery, the multiple-use special marine protected areas, the focus of the law, which is related to marine habitat protection, and nature compensation are different in the Netherlands than China. The conservation statuses of cetacean bycatch species and the quantities of the discards are different in Dutch fishery than Chinese fishery. The awareness of NGOs on cetacean bycatch reduction and sustainable fishery, the attitude of the public towards sustainable fishery, and the attitudes of fishery stakeholders towards MSC certification programme in the Netherlands are different from China.

Based on these differences, developing projects on cetacean bycatch reduction and sustainable fishery with NGOs in China from the experiences in the Netherlands, raising the awareness of the public on the impact of bycatch and overfishing on marine ecosystems in China, and MSC certifying Chinese fisheries would be good action points to improve the current situation of marine conservation in China.

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## Introduction

Bycatch remains perhaps the greatest immediate and well-documented threat to cetacean populations globally (Reeves, R. R., *et al.*, 2005). Cetacean bycatch is increasing in intensity and frequency (Demaster, D. J., *et al.*, 2001). As a response to this problem, Kust en Zee (Dutch part of EUCC (Coastal and Marine Union in Europe)) has started the Dolphin Saver project to test the effectiveness of 'Long Life Dolphin Saver' (a type of advanced pinger) on harbour porpoises in Dutch fishery in the North Sea, with the cooperation with a Dutch fishermen organisation 'Nederlandse Vissersbond' (K&Z, 2010). The distinguished sound of Dolphin Saver scares harbour porpoises away from the fishing boats to protect them from getting entangled in the fishing nets (Save Wave, 2010). Dolphin Saver project involves Dutch fishermen in the testing process, helping persuading them to use Dolphin Savers on their nets, giving that the Dutch fishery includes no fleet segments in which pingers are mandatory according to the criteria mentioned in the EU regulation (Couperus, A.S., 2009).

Kust en Zee wants to expand the Dolphin Saver project to a global scope, and the researcher is assigned to give advices on introducing pingers to Chinese fishermen. However, when starting collecting data, it turned out that marine conservation awareness, including which towards cetacean bycatch, in China is different from the Netherlands, which this idea is based on. Therefore, the research objectives have been adjusted into showing the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness - four main aspects in marine conservation, to reflect the differences in the current situation of marine conservation between the Netherlands and China to the organisations in the Netherlands or Europe which are interested in improving the current situation of marine conservation, or want to start projects on marine conservation in China, such as NGOs like EUCC, research institutions, European Commission, et cetera, so that they can have a better knowledge of the situation they might need to deal with. Marine conservation awareness refers to the knowledge in respect of the protection and preservation of marine ecosystems. Marine species and habitat protection refers to the concepts and measures in, and implementation of legislations and policies, and other activities, such as research and monitoring, in respect of protecting marine species and their habitats. Bycatch refers to relevant legislations and policies on bycatch, the types and figures of bycatch, discards, and its impact on marine ecosystems.

The main research question of this research is: What are the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China? It is based on the following sub-questions: 1. What are the differences in the current situation of marine species protection between the Netherlands and China? 2. What are the differences in the current situation of marine habitat protection between the Netherlands and China? 3. What are the differences in the current situation of bycatch between the Netherlands and China? 4. What are the differences in the current situation of marine conservation awareness between the Netherlands and China?

Chapter 1 describes the problem which leads to the research objectives. Chapter 2 presents the methodology which is used in this research. Chapter 3 presents the results of comparing the current situation of marine species protection between the Netherlands and China - the differences wherein. Chapter 4 presents the results of comparing the current situation of marine habitat protection between the Netherlands and China - the differences wherein. Chapter

5 presents the results of comparing the current situation of bycatch between the Netherlands and China - the differences wherein. Chapter 6 presents the results of comparing the current situation of marine conservation awareness between the Netherlands and China - the differences wherein. The summary of the answers of research questions is in Conclusion. Some action points which might be useful for the readers are in Recommendation.

## **1 Problem description**

Kust en Zee wants to expand the Dolphin Saver project to a global scope, and the researcher is assigned to give advices on introducing pingers to Chinese fishermen. It is as a ‘daughter project’ in China, corresponding to the pilot project of the Dolphin Saver project which targeted on Dutch fishermen. This idea is based on the knowledge which Kust en Zee has of marine conservation awareness in the Netherlands. However, when starting collecting data, the researcher found that marine conservation awareness, including which towards cetacean bycatch, in China is different from the Netherlands. Therefore, the research objectives have to be adjusted in order to adapt to this unexpected situation.

Kust en Zee has not had an accurate knowledge of the current situation of marine conservation in China before planning to implement a project on marine conservation - the Dolphin Saver project, in China, thus comes this unexpected situation. This problem shows that it is crucial to have a good view of the current situation of marine conservation in China, especially the differences in the current situation of marine conservation between the Netherlands and China for Dutch NGOs, before starting any project on marine conservation in China. Therefore, this research changes into showing the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness - four main aspects in marine conservation, to reflect the differences in the current situation of marine conservation between the Netherlands and China.

## 2 Methodology

All the data is collected from open resources – the Internet, through keyword searching on websites such as Google, Google Scholar, MetaLib and Chinese document searching websites. The keywords, which including in English, Dutch and Chinese, are with respect of marine species and habitat protection, bycatch and marine conservation awareness, such as the titles of the legislations, bycatch types, et cetera, in the Netherlands and China, for example, ‘seabird bycatch china’.

All the differences in marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China are find out through comparing the corresponding facts of these four aspects in 4 tables (see Appendix II). The first columns of 4 tables are the title columns. The current situation of these four aspects between the Netherlands and China are the second and third columns respectively. The first rows of 4 tables are title rows. Every sub-aspect within these four aspects is a row under the title row. For example, there are three sub-aspects – the marine conservation awareness of fishermen, NGOs and the public for marine conservation awareness. All the data is analysed and distributed under each sub-aspect. The differences of each sub-aspect between the Netherlands and China are the fourth columns of 4 tables. Based on these differences of each sub-aspect between the Netherlands and China, some action points for improving the current situation of marine conservation in China are suggested, which are the fifth and the last columns of 4 tables.

### **3 Comparing the current situation of marine species protection between the Netherlands and China**

This chapter compares the current situation of marine species protection, including relevant legislations and policies, the implementation of relevant legislations and policies, the coverage of protected marine species and corresponding database, the strict level of the marine species protection, ecological impact assessment for marine species, research and monitoring on marine species, and protection level of marine species from fishery between the Netherlands and China, and shows the differences wherein.

#### ***3.1 Current situation of marine species protection in the Netherlands***

This sub-chapter shows the current situation of marine species awareness, including relevant legislations and policies, the implementation of relevant legislations and policies, the coverage of protected marine species and corresponding database, the strict level of marine species protection, ecological impact assessment for marine species, research and monitoring on marine species, and protection level of marine species from fishery in the Netherlands.

##### **Legislations and policies on marine species protection**

The laws, which are related to marine species protection in the Netherlands, are: Flora and Fauna Act (Flora- en faunawet) (Overhead.nl, 2010b) and Fisheries Act (Visserijwet) (Overhead.nl, 2010a). There is no law on for the prevention of alien marine species in import and export trades in the Netherlands. No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) (Wetboek online, 2010) in the Netherlands has been found.

Other regulations and policies which are related to marine species protection in the Netherlands are: Red Lists (LNV, 2004) - a list of marine species which have disappeared from a specific area, and marine species which have sharply decreased or are rare in an area (LNV, 2010a), which is drawn up by the Minister of LNV; incentive measures for active protection the marine species, whose survival is threatened, are dealt with in the Multi-year Programme for Implementation of Species Policy (Meerjarenprogramma Uitvoering Soortenbeleid) 2000-2004, which is aimed at drafting and implementing of national species protection plans for endangered species (LNV, 2010a). There are specific marine species protection plans for endangered and Red List marine species (LNV, 2007). The national species protection plans indicate what extra measures are needed to protect endangered marine species in the Netherlands (MNP, 2004b). No information whether the protection plans for the endangered and Red List marine species are adequate or not, in the Netherlands has been found.

No information on legal system of legislation and policies which are related to species protection in the Netherlands has been found.

A provincial compensation scheme can contain regulations which are aimed specifically to preservation of marine species. In this case, the provincial marine species policy goes beyond the national policy (edu2.web.wur.nl, 2010).

In conclusion, whether the punishment of illegal catching, killing, transporting, and selling of protected marine species or the protection of endangered marine species in the Netherlands are adequate or not are unclear, since no enough information has been found to draw a relevant conclusion on them.

### **Implementation of the legislations and policies on marine species protection**

The implementation of the plans is coordinated by various different organisations. At first, the Ministry of LNV coordinated the implementation, but the coordination has gradually passed into the hands of the provinces and marine species protection organisations (MNP, 2004b).

### **Coverage of protected marine species and corresponding database**

In the Netherlands, all native marine species are under the protection of Flora and Fauna Act (edu2.web.wur.nl, 2010). All native fish are protected, with the exception of species to which the Fisheries Act applies (MNP, 2004a).

The distribution data of all protected marine species in the Netherlands is in National Database Flora and Fauna (GaN, 2010).

In conclusion, there is a full coverage of marine species protection up to almost all the native marine species, as well as in corresponding database in the Netherlands.

### **Strict level of marine species protection**

No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) (Wetboek online, 2010) in the Netherlands has been found.

The activities which are prohibited by the law to protect marine species reflect the strict level of marine species protection. All activities which are dangerous to marine wildlife are prohibited according to the prohibitive conditions in Flora and Fauna Act (edu2.web.wur.nl, 2010). Additional provisions apply with respect to seabirds and to the marine species listed in Annex IV to the Habitats Directive (MNP, 2004a).

It is possible to deviate from the provisions of certain prohibitions if doing so does not affect the preservation of the marine species unfavourably. If the population size and the range of distribution do not decrease significantly and when the marine species can survive in a natural manner, a spatial operation can be permitted. But first an exemption has to be granted. For Strictly protected marine species, because of the very strict demands of the European Birds Directive, it is not possible to obtain exemption for negative impact on protected seabirds.

The impacts on strictly protected marine species have to be assessed explicitly on the risk of jeopardizing the 'favourable conservation status'. When this happens, no exemption is possible. When the impact on strictly protected marine species is not very serious, an exemption is possible under special conditions. Protected marine species are subject to a less strict standard of review. Prohibitive conditions, concerning disturbance, will no longer apply to common marine species. It will be no longer necessary to make an extensive assessment with regard to these groups of marine species. Prohibitive conditions on killing these marine species and a duty of care still apply. When negative impact is expected on other than strictly protected marine species, and where the 'favourable conservation status' is not in danger, an exemption can be requested (edu2.web.wur.nl, 2010).

'Flora and Fauna Act' includes a duty of care, applying to all marine species. To every project, location, action or activity, prohibitive conditions and the 'duty of care' applies: 'everyone is required to treat all wildlife and their habitats with due care'. In other words, 'everyone who knows or within reason can suspect that his actions or neglect may affect marine flora or

fauna, is obliged to omit such actions as far as this reasonably can be demanded of him, or to take measures that can be demanded of him, to prevent or otherwise limit the effects or to make them undone.' Everyone who for example, from the developer behind his desk, planning a new project, until the working people at the building site, should act or omit actions in a way, that the affect on marine species will be prevented or minimized (LNV, 2010a).

In conclusion, it is unclear how strict the protection of marine species is in the Netherlands, since no information on the most important aspect of the protection – the articles on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law has been found.

### **Ecological impact assessment for marine species**

Ecological impact assessment is obliged for every project which may have impact on protected marine species to describe the impact. Three aspects are important to the assessment: the size of the population, the range of distribution, and the naturalness of the situation. When making impact predictions, these aspects have to be specified and quantified as much as possible (Flora and Fauna Act) (edu2.web.wur.nl, 2010).

### **Monitoring and research of marine species**

Monitoring and research of marine ecosystems are carried out in IMARES in the Netherlands (IMARES, 2010). No information whether the researches of marine ecosystems meet the requirements of marine conservation in the Netherlands, or not, has been found.

In conclusion, it is unclear whether the researches of marine ecosystems meet the requirements of marine conservation in the Netherlands or not.

### **Protection level of marine species from fishery**

In the Netherlands, the areas which are permanently closed to fishing Seabed (mussel fishery, cockle fishing with bottom fishing gear with tickler chains) are equivalent to 26% of the Intertidal in the Wadden Sea. In the Seabed closed fishing areas, the shrimp fishery is not allowed on the flats (the Intertidal). The other trawl fisheries, whether or not fitted with tickler chains, on the flats (the Intertidal) throughout the PKB-field not allowed (VROM, LNV, RCW, 2010).

No information on the prohibited fishing gears in the Netherlands has been found.

In conclusion, permanently closed fishing area in the Netherlands is an important measure to protect marine species from fishery.

### **Conclusion**

In the Netherlands, the legislations and policies on marine species protection are Flora and Fauna Act, Fisheries Act, Ret Lists, national species plans and provincial compensation policies. The implementation of the plans is coordinated by various different organisations. All native marine species are protected by Flora and Fauna Act, whose distribution data are in National Database Flora and Fauna. All activities which are dangerous to marine wildlife are prohibited according to the prohibitive conditions in Flora and Fauna Act. Ecological impact assessment is obliged for every project which may have impact on protected marine species to describe the impact. Monitoring and research of marine ecosystems are carried out in IMARES. The area, which is permanently closed to fishing Seabed, is equivalent to 26% of the Intertidal in the Wadden Sea.

### **3.2 Current situation of marine species protection in China**

This sub-chapter shows the current situation of marine species awareness, including relevant legislations and policies, the implementation of relevant legislations and policies, the coverage of protected marine species and corresponding database, the strict level of marine species protection, ecological impact assessment for marine species, research and monitoring on marine species, and protection level of marine species from fishery in China.

#### **Legislations and policies on marine species protection**

The laws, which are related to marine species protection in China, are: Article 9 of the Constitution (NPC, 2004), Wildlife Protection Law (Standing Committee, 2009), Fisheries Law (Standing Committee, 1986), Import and Export Animal and Plant Quarantine Law, which is for the prevention of alien marine species in import and export trades (Standing Committee, 1991) and Criminal Law (Standing Committee, 1997).

Other regulations and policies which are related to marine species protection in China are: the 1989 National Wildlife Protection List, where the Chinese White Dolphin (*Sousa chinensis chinensis*) (Near Threatened) (IUCN Red List, 2008a) are under first class protection; other cetaceans, Loggerhead (*Caretta caretta*) (Endangered) (IUCN Red List, 1996), Green turtle (*Chelonia mydas*) (Endangered) (IUCN Red List, 2004), Hawksbill turtle (*Eretmochelys imbricata*) (Critically Endangered) (IUCN Red List, 2008b), Olive Ridley (*Lepidochelys olivacea*) (Vulnerable) (IUCN Red List, 2008c) are under second class protection (SFA, 1989), and Local Wildlife Protection Lists, which are in different provinces, autonomous regions or municipalities directly under the Central Government. For example, Lemur-tail Seahorse (*Hippocampus mohnikei*) (Data Deficient) (IUCN Red List, 2006) is on Wildlife Protection List of Liaoning Province (Liaoning provincial government, 1991), Regulations for the Implementation of Wild Aquatic Animal Protection (State Council, 1993), Regulations on Wild Medicinal Material Resource Conservation and Management (State Council, 1987) (Xu, H. et al., 1999), Provisions on the Conservation of Biological Resources in Bohai Sea (MOA, 2004), Implementing Regulations on Fishery Law (State Council, 1987) (Xu, H. et al., 1999), Fishing Regulations in Guangdong Province (Oceanic and Fishery Administration of Guangdong Province, 2007).

The legal systems to implement these legislations and policies are the System of Environmental Impact Assessment (EIA), which defined by the 1986 Administrative Rule for Environmental Protection of Construction Projects; the licensing system include fishing license stipulated by the Fishery Law, marine special catching license and export certificate stipulated by the Wildlife Protection Law, and the Implementing Regulation on Aquatic Wild Animal Conservation; the quarantine system based on the Import and Export Animal and Plant Quarantine Law to prevent the adverse impact of alien marine species on native marine biodiversity (Xu, H., et al., 1999).

No information on provincial compensation policy which is special for species preservation in China has been found.

In conclusion, the legislations on the protection of endangered marine species need to be updated. For example, Loggerhead (*Caretta caretta*) (Endangered) (IUCN Red List, 1996), Green turtle (*Chelonia mydas*) (Endangered) (IUCN Red List, 2004), Hawksbill turtle (*Eretmochelys imbricata*) (Critically Endangered) (IUCN Red List, 2008b), Olive Ridley (*Lepido-*

*chelys olivacea*) (Vulnerable) (IUCN Red List, 2008c) are under inadequate protection - second class protection on National Wildlife Protection List.

### **Implementation of the legislations and policies on marine species protection**

No information on the implementation of legislations and policies on marine species protection in China has been found.

### **The coverage of protected marine species and corresponding database**

In China, the rare or of endangered marine species are under the protection of the Constitution (NPC, 2004) and Wildlife Protection Law (Standing Committee, 2009), and their information are in the Endangered and Protected Species Database of Chinese Animals (CAS, 2010).

In conclusion, the protection and information in the database only cover part of marine species—rare and endangered marine species, which means, other ‘not endangered’ marine species are lack of protection in China.

### **Strict level of marine species protection**

The punishments for illegal catching, killing, transporting, and selling protected marine species reflect the strict level of marine species protection. In China, they are up to more than ten years of sentences and imposition of heavy fines (Criminal Law) (Standing Committee, 1997).

It is prohibited to catch or kill marine wildlife under special state protection (Article 16 of Wildlife Protection Law) (Standing Committee, 2009). It is prohibited to catch and kill marine species under first class protection (Regulations on Wild Medicinal Material Resource Conservation and Management) (Xu, H. et al., 1999). It is prohibited to sell and purchase protected marine species (Wildlife Protection Law) (Standing Committee, 2009). Fishing rare and endangered marine species is prohibited (Fisheries Law) (Standing Committee, 1986). Where catching or fishing marine wildlife which is under first class state protection is necessary for scientific research, domestication and breeding, exhibition or other special purposes, the concerned unit must apply for a special catching license to wildlife administration department of the State Council; where catching or fishing of marine wildlife under second class state protection is intended, the concerned unit must apply for a special catching license to wildlife administration department of a provincial government, an autonomous region or a municipality which is directly under the Central Government (Article 16 of Wildlife Protection Law). Anyone who is engaged in catching marine wildlife must observe the prescriptions of the special catching license or the catching license with respect to the species, quantity, area and time limit (Article 19 of Wildlife Protection Law). It is allowed to catch and kill the marine species under second and third classes protection with a license (Regulations on Wild Medicinal Material Resource Conservation and Management) (Xu, H. et al., 1999).

In conclusion, illegal catching, killing, transporting, and selling of rare and endangered marine species can incur sentences up to more than ten years in China.

### **Ecological impact assessment for marine species**

Ecological impact assessments for capital construction projects, technical renovation projects as well as regional development construction projects that may generate impact on the marine biodiversity should follow the Environmental Impact Assessment (EIA) system (Wildlife Protection Law) (Standing Committee, 2009; Xu, H., et al., 1999). No information on what aspect has to be in ecological impact assessment in China has been found.

### **Monitoring and research of marine species**

The monitoring centre for marine species is in the Ministry of Forestry (MOF). The Chinese Ecosystem Research Network (CERN) contains marine ecological field stations, which are set up by the Chinese Academy of Sciences (CAS), where the researches on structures, functions and succession of marine ecosystems and marine species dynamics are conducted. The research on marine biodiversity is far from meeting the requirements of marine conservation in China. The distribution, functions, benefits, losses, and threats of marine biodiversity have not been clearly identified, and this hinders marine conservation in China (Xu, H., *et al.*, 1999).

In conclusion, the research on marine biodiversity is far from meeting the requirements of marine conservation in China.

### **Protection level of marine species from fishery**

The summer closed fishing season in South China Sea is from 12 o'clock on the first of June till 12 o'clock on the first of August. At present the controlled fishing vessels under the system are trawler and canvas stow net in East China Sea. Lin Wendan and Lin Shoude (2006) consider that the summer closed fishing season should be from 12 o'clock on the fifteenth of May till 12 o'clock on the fifteenth of July. The season should be longer, because (1) the spawning season is in the spring. The developing season of fingerling is between April and May. The growing season of fingerling is between June and September. (2) The most active fishery production period is in May and fishing effort is highest. And the season should be advanced 2 weeks. The gill net and angling fisheries should be restricted during summer closed fishing season. More fishing gears should be restricted in Chinese marine fishery (Gao, J., 2006).

The fishing gears which may harm fish resources are illegal (Regulations of Fish Resources Protection in Bohai Sea) (MOA, 1991).

In conclusion, summer closed fishing season in China should be longer to fit feeding period of marine species.

### **Conclusion**

In China, the legislations and policies on marine species protection are Wildlife Protection Law, Fisheries Law, the 1989 National Wildlife Protection List, Local Wildlife Protection Lists, and other laws and regulations, as well as legal systems such as the System of Environmental Impact Assessment. The rare or endangered marine species are under the protection of the Constitution and Wildlife Protection Law, and their information are in the Endangered and Protected Species Database of Chinese Animals. The punishments for illegal catching, killing, transporting, and selling protected marine species are up to more than ten years of sentences and imposition of heavy fines. Ecological impact assessments for capital construction projects, technical renovation projects as well as regional development construction projects that may generate impact on the marine biodiversity should follow the EIA system. The monitoring centre for marine species is in the Ministry of Forestry. The Chinese Ecosystem Research Network contains marine ecological field stations, where the researches on structures, functions and succession of marine ecosystems and marine species dynamics are conducted. The summer closed fishing season in South China Sea is from 12 o'clock on the first of June till 12 o'clock on the first of August.

### ***3.3 Differences in the current situation of marine species protection between the Netherlands and China***

This sub-chapter shows the differences in the current situation of marine species protection, including relevant legislations and policies, the implementation of relevant legislations and policies, the coverage of protected marine species and corresponding database, the strict level of marine species protection, ecological impact assessment for marine species, research and monitoring on marine species, and protection level of marine species from fishery, between the Netherlands and China (see Table 1 in Appendix II).

#### **Legislations and policies on marine species protection**

The law on the prevention of alien marine species in import and export trades in China is Import and Export Animal and Plant Quarantine Law. There is no law on for the prevention of alien marine species in import and export trades in the Netherlands. Therefore, the law on the prevention of alien marine species in import and export trades in China is different than the Netherlands. No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to compare with China.

No information whether the protection plans for the endangered and Red List marine species are adequate or not, in the Netherlands has been found to compare with China.

No information on legal system of legislation and policies which are related to species protection in the Netherlands has been found to compare with China.

No information on provincial compensation policy which is special for species preservation in China has been found to compare with the Netherlands.

#### **Implementation of the legislations and policies on marine species protection**

No information on the implementation of legislations and policies on marine species protection in China has been found to compare with the Netherlands.

#### **The coverage of protected marine species and corresponding database**

In the Netherlands all native marine species are protected and included in the database. In China, only endangered marine species are protected and included in the database. Therefore, the coverage of protected marine species and corresponding database is different in the Netherlands than China.

#### **Strict level of marine species protection**

No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to compare with China.

No big difference in the regulations on the protection of marine species between the Netherlands and China has been found. The activities which harm protected marine species are prohibited in both the Netherlands and China.

#### **Ecological impact assessment for marine species**

No information on what aspect has to be in ecological impact assessment in China has been found to compare with the Netherlands.

### **Monitoring and research of marine species**

No information whether the researches of marine ecosystems meet the requirements of marine conservation, or not, in the Netherlands has been found to compare with China.

### **Protection level of marine species from fishery**

There are areas which are permanently closed to fishing in the Netherlands. Only in the summer closed fishing season, there are areas which are closed to fishing in China. Therefore, the level of the protection of marine species from fishery is different in the Netherlands than China.

No information on the prohibited fishing gears in the Netherlands has been found to compare with China.

### **Conclusion**

The coverage of protected marine species, as well as in corresponding databases, and the level of protection of marine species from fishery are different in the Netherlands than China.

## ***3.4 Conclusion of comparing the current situation of marine species protection between the Netherlands and China***

In the Netherlands, the legislations and policies on marine species protection are Flora and Fauna Act, Fisheries Act, Ret Lists, national species plans and provincial compensation policies. The implementation of the plans is coordinated by various different organisations. All native marine species are protected by Flora and Fauna Act, whose distribution data are in National Database Flora and Fauna. All activities which are dangerous to marine wildlife are prohibited according to the prohibitive conditions in Flora and Fauna Act. Ecological impact assessment is obliged for every project which may have impact on protected marine species to describe the impact. Monitoring and research of marine ecosystems are carried out in IMARES. The area, which is permanently closed to fishing Seabed, is equivalent to 26% of the Intertidal in the Wadden Sea.

In China, the legislations and policies on marine species protection are Wildlife Protection Law, Fisheries Law, the 1989 National Wildlife Protection List, Local Wildlife Protection Lists, and other laws and regulations, as well as legal systems such as the System of Environmental Impact Assessment. The rare or endangered marine species are under the protection of the Constitution and Wildlife Protection Law, and their information are in the Endangered and Protected Species Database of Chinese Animals. The punishments for illegal catching, killing, transporting, and selling protected marine species are up to more than ten years of sentences and imposition of heavy fines. Ecological impact assessments for capital construction projects, technical renovation projects as well as regional development construction projects that may generate impact on the marine biodiversity should follow the EIA system. The monitoring centre for marine species is in the Ministry of Forestry. The Chinese Ecosystem Research Network contains marine ecological field stations, where the researches on structures, functions and succession of marine ecosystems and marine species dynamics are conducted. The summer closed fishing season in South China Sea is from 12 o'clock on the first of June till 12 o'clock on the first of August.

The coverage of protected marine species, as well as in corresponding databases, and the level of protection of marine species from fishery are different in the Netherlands than China.

## **4 Comparing the current situation of marine habitat protection between the Netherlands and China**

This chapter compares the current situation of marine habitat protection, including no-take marine nature reserves, multiple-use special marine protected areas, the implementation of legislations and policies on marine habitat protection, the figures on marine protected areas, legislations and policies on no-take marine nature reserves and multiple-use special marine protected areas, the strict level of marine habitat protection, the establishment, the management, monitoring and evaluation of marine protected areas, nature compensation for marine habitats, and problems in marine conservation, between the Netherlands and China, and shows the differences wherein.

### ***4.1 Current situation of marine habitat protection in the Netherlands***

This sub-chapter shows the current situation of marine habitat protection, including no-take marine nature reserves, multiple-use special marine protected areas, the implementation of legislations and policies on marine habitat protection, the figures on marine protected areas, legislations and policies on no-take marine nature reserves and multiple-use special marine protected areas, the strict level of the marine habitat protection, the establishment, the management, monitoring and evaluation of marine protected areas, nature compensation for marine habitats, and problems in marine conservation, in the Netherlands.

#### **No-take marine nature reserves (MNRs)**

The no-take marine nature reserves in the Netherlands are: marine sites of Natura 2000 sites (LNV, 2007), and marine nature areas refer to ‘Nature Monuments’ (LNV, 2010b), ‘Special Protection Areas (SPAs)’ (LNV, 2010a) and ‘National Ecological Network’ (Ecologische Hoofdstructuur, EHS) (LNV, 2007).

#### **Multiple-use special marine protected areas (SMPAs).**

The multiple-use special marine protected areas in the Netherlands are: marine nature areas refer to ‘National Parks’ (NPs) (LNV, 2010a). But no marine nature area in National Landscapes (LNV, 2010d) has been found.

#### **Implementation of legislations and policies on marine habitat protection**

No information on the implementation of legislations and policies on marine habitat protection in the Netherlands has been found.

#### **Figures on marine protected areas (MPAs)**

There are 16 marine sites of Natura 2000 sites (LNV, 2006b) in the Netherlands.

#### **Legislations and policies on no-take MNRs**

The law which is special for no-take marine nature reserves is Nature Conservation Act (Overheid.nl, 2010c).

Other legislations and policies for no-take marine nature reserves are: Natura 2000, the management plans for 16 marine sites of Natura 2000 sites (LNV, 2010c), the EHS, Green Space Structure Plan (Structuurschema Groene Ruimte, SGR), and the permit system with permits

issued by the provincial governments or the Ministry of LNV (LNV, 2010a). Marine habitat protection can also be realised through spatial planning laws. Municipal zoning plans, for example, must take account of designated marine nature reserves (edu2.web.wur.nl, 2010).

In conclusion, there is a comprehensive legal system of no-take marine nature reserves in the Netherlands.

#### **Legislations and policies on multiple-use SMPAs**

The policies which are for multiple-use special marine protected areas are: annual subsidies for NPs with marine nature areas to implement their year plans as based on the ten-year management and development plans, which are granted by the Minister of LNV. The Ministry may also give one-off support to activities that enhance the quality of the marine nature areas of the NPs (SNP, 2010b). No marine nature area in National Landscapes in the Netherlands has been found.

#### **Strict level of marine habitat protection**

No information on the punishment of damaging protected marine nature areas in the Netherlands has been found.

The requirements for the protection of marine habitats reflect the strict level of marine habitat protection. Nature Conservation Act lays down a duty of care for everyone in or dealing with marine nature areas. Actions which might cause damage should not be undertaken (LNV, 2007). A permit must be obtained for activities that may have a detrimental effect on marine natural values (edu2.web.wur.nl, 2010).

In conclusion, it is unclear how strict marine habitat protection is in the Netherlands, since No information on the punishment of damaging protected marine nature areas has been found.

#### **The establishment of the MPAs**

No information on the establishment of marine protected areas in the Netherlands has been found.

#### **The management of the MPAs**

A management plan must be adopted within three years after a marine nature area is designated as Natura 2000 site. It is set up to six years, followed by a new plan. The concerned coastal provinces are generally responsible for preparing management plans for 16 marine sites. The management plans are in close consultation with owners, users and other concerned authorities, particularly municipalities, provinces and water boards. The concerned governments propose the management plans, and the State manages or takes responsibility for 16 marine sites (LNV, 2010c). A dual approach was taken in formulating the Natura 2000 targets (conservation objectives) for marine nature areas of Natura 2000 sites at national level and at site level. One process line focuses on marine habitat types and marine species and leads to the targets at national level and also to a picture of the relative importance and conservation status of the marine habitat types and marine species for which the Netherlands has responsibility, with more detailed interpretation and assessment of the objectives and targets. The second process line leads to marine conservation objectives at site level. The analyses carried out in connection with this second process line provided important input for the purpose of assigning conservation objectives to specific marine sites. Standard formulations of the process of formulating the Natura 2000 targets for 16 marine sites are: discussions, con-

sultation rounds, developing public support, sharing of information and expert meetings (LNV, 2006a).

In deciding on strategy and policy, the NP work closely together in the platform Samenwerkingsverband Nationale Parken (SNP) (SNP, 2010b). Landowners, site managers and other stakeholders are jointly responsible for the conservation and development of the quality of these nature areas (SNP, 2010a). Each park with marine nature areas has at least one visitor information centre, which aims to inform, teach and amuse both young and old. In many NPs with marine nature areas, studies are conducted into park management and design for the marine nature areas (LNV, 2007).

There are different organisations for the management of different Natura 2000 sites. For example, there are 7 different organisations listed as management bodies for Natura 2000 site Number 1 Wadden Sea (LNV, 2010e). It might raise conflicts and confusion of authority and lead to low efficiency of the management of Natura 2000 sites.

In conclusion, there are specific conservation objectives from perspectives of both marine ecosystems and every Natura 2000 site of 16 marine sites, which are very helpful for marine conservation in the Netherlands.

### **Monitoring and evaluation of the MPAs**

No information on monitoring and evaluation of marine protected areas in the Netherlands has been found.

### **Database of marine nature reserves**

There are databases of different types of marine natures in the Netherlands (LNV, 2010f).

### **Nature compensation for marine habitats**

A compensation for affecting marine areas which are part of the EHS is obliged according to the SGR. In case such marine areas lose their ecological function, or when these functions are affected, compensating measures will have to be taken. For each case, the basic assumption is that no 'net loss' on marine natural values with respect to size and quality is allowed. The initiator of a spatial operation in such a marine area is responsible for the actual compensation. There are two types of compensations according to the SGR: physical and financial compensation. A new marine area of the same size and quality as the destroyed marine area is equipped in the direct surrounding area of the spatial operation as a physical compensation; if physical compensation, caused by circumstances which beyond one's control, is not or only insufficiently possible, this will be replaced by a financial compensation for the loss of marine nature.

A compensation proposition has to be submitted with the exemption request for negative effects on a European protected marine nature area. The compensation plan has to meet the rules which are at some point stricter than the compensation obligation of the SGR. Therefore, a financial compensation will never be sufficient (Nature Conservation Act, 2005) (Overheid.nl, 2010c).

Many coastal provinces have drawn up their own compensation policy in conjunction with the SGR. The conditions for compensation are usually in line with the requirements of the SGR. In this case, the provincial compensation policy goes beyond the national policy for marine nature areas (edu2.web.wur.nl, 2010).

In conclusion, nature compensation in the Netherlands mainly follows SGR, containing not only financial compensation, but also physical compensation.

### **Problems in marine conservation**

No information on the problems of the education of marine biodiversity and conservation in the Netherlands has been found.

No information on the problems of legislations or law enforcement of marine conservation in the Netherlands has been found.

### **Conclusion**

In the Netherlands, the no-take marine nature reserves are marine sites of Natura 2000 sites, and marine nature areas refer to ‘Nature Monuments’, ‘Special Protection Areas’ and ‘National Ecological Network’ (EHS). The multiple-use special marine protected areas are: marine nature areas refer to ‘National Parks’ (NPs). There are 16 marine sites of Natura 2000 sites in the Netherlands. The legislations and policies which are for no-take marine nature reserves are Nature Conservation Act, Natura 2000, the management plans of Natura 2000 sites, the EHS, Green Space Structure Plan, the permit system and spatial planning laws; for multiple-use special marine protected areas are annual subsidies for NPs. The duty of care and the permit system are for marine habitat protection. A management plan is required for each Natura 2000 site, and a dual approach was taken in formulating the Natura 2000 targets. There are databases of different types of marine natures in the Netherlands. The compensation is obliged for affecting marine areas which are part of the EHS or European protected marine nature areas.

## ***4.2 Current situation of marine habitat protection in China***

This sub-chapter shows the current situation of marine habitat protection, including no-take marine nature reserves, multiple-use special marine protected areas, the implementation of legislations and policies on marine habitat protection, the figures on marine protected areas, legislations and policies on no-take marine nature reserves and multiple-use special marine protected areas, the strict level of marine habitat protection, the establishment, the management, monitoring and evaluation of marine protected areas, nature compensation for marine habitats, and problems in marine conservation, in China.

### **No-take marine nature reserves (MNRs)**

The no-take marine nature reserves in China are the MNRs (MOA, 1995).

### **Multiple-use special marine protected areas (SMPAs)**

The multiple-used special marine protected areas are SMPAs - any area with special geographic conditions, ecosystem, living or non-living resources, and where marine development and exploitation are with special needs; and a special management may be ensured by adopting effective conservation measures and scientific development models (Article 23 of Marine Environment Protection Law) (Standing Committee, 1999), and marine nature areas refer to ‘National Park of China’ (National Park of China, 2010).

### **Implementation of legislations and policies on marine habitat protection**

Many action plans or projects on marine conservation in China’s Agenda 21 have not been implemented due to insufficient funding. Insufficient funding, long-term preparation and init-

iation of GEF projects have impaired the effective implementation of some priority projects (Xu, H., *et al.*, 1999).

### **Figures on marine protected areas (MPAs)**

There are 158 MPAs (see Table 1 in Appendix I), include 32 NMNRs (see Table 2 in Appendix I) and 114 Local-level MNRs in China now (Qiu, W. *et al.*, 2009). No-take MNRs currently account for 94.4% of the total area of China's MPA system, which differs strongly from the global situation, where no-take zones constitute only a tiny fraction of the global MPA system (Wood, L. *et al.*, 2007). There are also planning MNRs with area of 12 million hm<sup>2</sup> by 2010, which is 2.5 percent area of marine habitats (The Guideline for Nature Reserves Development Planning in China 1996–2010, see Table1 in Appendix I) (Xu, H., *et al.*, 1999).

### **Legislations and policies on no-take MNRs**

The law which is related to no-take MNRs is Marine Environment Protection Law (Stand Committee, 1999) and Island Protection Law (Standing Committee, 2010).

The regulations and policies on no-take MNRs are Regulations on Nature Reserves (State Council, 1994), the 1996 Rule of Marine Nature Reserves (Qiu, W. *et al.*, 2009), and Measures on the Management of Marine Nature Reserves (SOA, 1995) (Zou, K. 2003), China's Ocean Agenda 21 (SOA, 1996), Chinese Oceanic Biodiversity Conservation Action Plan, the management plans of the MNRs (Xu, H. *et al.*, 1999), the Programme on Developing China's Marine Nature Reserves, including the plans to establish a network of MNRs (Bureau of Comprehensive Marine Management, 1996), the Guideline for Oceanic Nature Reserve Development Planning in China (1996–2010), the National Ecological Environment Protection Programme (2000), the Programme of the Management of National Marine Environmental Protection (Xu, H. *et al.*, 1999), the Principles on Categorising Marine Nature Reserves and Dividing Their Levels (State Bureau of Quality Technology Supervision, 1998) (Zou, K. 2003), the special fund of the policy for ecological environment compensation fee (Xu, H. *et al.*, 1999), the Scheme on Construction of Sanya Coral Reef Nature Reserve (SOA, 1995), Chapter 15 of China's Agenda 21 (SPC, 1996), the Chinese Environmental Protection Action Plan (1991–2000) (MEP and SPC, 1994), the Outline for Ninth Five-Year Plan and Perspective Objectives by 2010 for Economic and Social Development of the People's Republic of China (NPC, 1996) (Xu, H. *et al.*, 1999), and Chapter Six of the Chinese Country Study on Biological Diversity (MEP, 1998a).

In conclusion, there is lack of a law which is special for no-take marine nature reserves in China.

### **Legislations and policies on multiple-use SMPAs**

No legislation or policy on National Park in China has been found. The regulation on multiple-used SMPAs is Interim Rule of Special Marine Protected Areas (SOA, 2005).

### **Strict level of marine habitat protection**

The punishment of illegal killing, fishing, aquaculture and other damaging to the habitats in MNRs reflects the strict level of marine habitat protection. In China, it is a fine of up to RMB 10,000 (Articles 34, 35 and 38 of Regulations on Nature Reserves) (State Council, 1994).

Illegal fishing or collecting marine living species, and other activities which harm marine species and their habitats are prohibited in MNRs (Article 15 of the 1995 Measures on the Management of Marine Nature Reserves) (MOA, 1995). The management of MPAs follows a zoning scheme (Qiu, W., *et al.*, 2009). A MNR may be divided into core, buffer, and experimental zones in accordance with the natural environment, natural resource conditions, and requisite level of protection. No activities can be conducted in the core zone except for scientific investigations and research approved by the department of ocean management at the provincial level; in the buffer zone, appropriate fishing production, tourism, scientific research, and educational excursion may be conducted in a limited time and scope and subject to the approval of the management organ of the protected area, on the condition that the protected objects are not damaged or polluted; appropriate development activities with a plan may be conducted in the experimental zone under the guidance of the management organ. A MNR may also be protected for an absolute or relative period. Absolute protection period refers to a certain period when adverse activities against the protected objects are prohibited; and appropriate scientific research or teaching excursion may be conducted subject to the approval. Relative protection period refers to the time except the absolute protection period when other activities can be conducted except for catching or harming the protected objects (Article 13 of the 1995 Measures on the Management of Marine Nature Reserves) (MOA, 1995). Killing and catching marine wildlife and other activities which are harmful to living and breeding of marine wildlife are prohibited in MNRs and areas, and during seasons which are closed to killing and catching (Article 20 of Wildlife Protection Law) (Standing Committee, 2009).

In conclusion, there is only fine for the damage of protected marine habitats in China, which is not enough for a profound protection.

### **The establishment of the MPAs**

For national MPAs, candidate sites and their boundaries are proposed by provincial governments, evaluated by a special protected-area committee consisting of scientists and representatives from relevant national government agencies, and submitted to the State Council for MNRs or State Oceanic Administration (SOA) for MSPAs for final approval and declaration. An emphasis on *de jure* fully protected MPAs and the lack of objective evaluations have enabled rapid and continuous increases in the number and area of fully protected MPAs on paper (Qiu, W. *et al.* 2009). There has been no systematic planning of MPAs at a national scale in China; therefore the selection of MPAs is often the responsibility of lower level governments (Liu, Y. and Qiu, J., 2005). Locally designated MPAs are nominated, evaluated, and declared by local governments (Qiu, W., *et al.*, 2009). Locally designated MPAs now contribute to over 75% of the number and 35% of the total area of the MPA system (See Table 1 in Appendix) (Xu, J. and Melick, D. R., 2007). But decentralised planning of the establishment of the MPAs leads to the selection of unsuitable areas and the exclusion of ecologically important areas from the MPA system (Liu, Y. and Qiu, J., 2005; Liu, J., *et al.*, 2003). Local governments in China often perceive the development of protected areas as a symbol of administrative achievement and a potential source of tourism income. As a result, important decisions such as the zoning and configuration of protected areas are regularly driven by local socio-economic interests rather than by strategic objectives; and rigorous scientific assessments are triggered only when a local government wants to upgrade a locally designated MPA to a national rank (Jim, C-Y. and Xu S-S-W. 2004).

The establishment of the MNRs is still very limited and there are many other marine areas that need protection under the legal framework. The ratio between marine and land nature

reserves is too small in terms of quantity and size (700 in number and 65 million ha.). The sea area is one-third of the land area, but the quantity of marine nature reserves are only one-twelfth of the total number of nature reserves in the country (Bureau of Comprehensive Marine Management, 1996).

Compared to MNRs, the establishment of SMPAs has been a recent development, with the first SMPA declared in 2002 (UNEP-WCMC, 2008).

In conclusion, the establishment of MPAs does not meet the requirements of marine conservation in China.

### **The management of the MPAs**

Currently, the MPA system in China is governed under a three-tier structure operating at national, local (provincial/municipal/county), and site levels. The State Council is the top policy- and decision-making body. The Ministry of Environmental Protection (MEP) oversees the development and management of the overall protected-area system in China, while the SOA is officially charged with the overall planning and supervision of the MPA system (See Figure 2 in Appendix I) (Qiu, W., *et al.*, 2009). Under the current governance structure, the central government is mainly responsible for the development of policies, regulatory frameworks, plans, and technical guidelines relevant to the overall MPA network. It also provides limited funds to cover the cost of infrastructures in newly established national MPAs (Cui, F. and Liu, B-Y., 2006). The bulk of protected-area funding in China now comes from local governments (Xu, J. and Melick, D. R., 2007). Local governments are mainly responsible for providing personnel and funds for the daily management and enforcement of individual MPAs and ensuring that the various national provisions related to MPAs are implemented within their jurisdictions (Cui, F. and Liu, B-Y., 2006). This results in a focus of responsibilities on local governments with little actual control of exploitation from the central government (Qiu, W., *et al.*, 2009).

There should be corresponding management organs equipped with professional and technical personnel for MNRs. They have the following responsibilities: (a) to implement laws, regulations, and policies relating to marine nature reserves; (b) to adopt detailed management methods and regulations for the protected areas and to manage all the activities within the areas; (c) to prepare overall plans to build up protected areas; (d) to place boundary markers and other protective facilities for the protected areas; (e) to organize basic investigations and regular monitoring in the protected areas and to establish the records for the protection work; (f) to organize ecological and environmental restoration and scientific research in the protected areas; and (g) to launch marine education programs (Article 12 of the 1995 Measures on the Management of Marine Nature Reserves) (MOA, 1995). The management of MNRs is part of the management of the country's overall nature reserves; also part of the protection of marine environment and the preservation of marine natural resources (Zou, K., 2003). No information on conservation objectives of MNRs in China has been found.

No information on the management of National Parks in China has been found.

A large proportion of MPAs, particularly locally designated MPAs, do not have management bodies and can easily become 'paper parks' due to lack of enforcement. For example, in the coastal province of Fujian, 43% of MPAs do not have a management body and staff to carry out routine enforcement tasks (Chen, C-M., 2006). The lack of funding and human resources is a major obstacle for adequate enforcement of MPAs (Liu, Y. and Qiu, J. 2005). It was re-

ported that protected-area funding in China was US\$52.7 per square kilometer in 1999, much lower than the average of US\$157 per square kilometer in developing countries estimated by the World Conservation Monitoring Centre in 1995 (CNCMB, 2000). Overall, the investment on China's MPA system has been extremely limited considering the relatively strict regulations and the huge difficulties for enforcement (Qiu, W. *et al.*, 2009).

Many MPAs in China suffer from low management effectiveness, resulting from limited stakeholder involvement, insufficient investment, and major conflicts between conservation objectives and socio-economic and political interests (Qiu, W., *et al.*, 2009). Insufficient public consultation in MPA decision-making potentially escalates people–park conflicts (Qiu, W. *et al.*, 2009). Activities such as pollution within and adjacent to the MPAs have resulted in large-scale, often irreversible, changes to marine ecosystems (SOA, 2008).

There is increasing participation and influence of local governments and private sectors, but very limited involvement of local communities in the management of MPAs in China (Qiu, W., *et al.*, 2009). Local governments and the private sector have played an essential role in the management of MPAs in China. In two out of three case studies in a programme policy analysis, the main source of MPA funding comes from the private sector and the county government, respectively. In all three cases, local governments facilitate coordination between the MPA management body and local government agencies, such as fishery, and tourism departments and local law enforcement units. With insufficient investment from higher level governments, the support from the private sector and local governments are described by all three MPA managers as “indispensable” to their work. However, the participation of the private sector and local governments has also brought dangers to conservation. Their participation has been strongly influenced by economic interests. Compared to the active participation of local governments and the private sector, local communities are less involved in MPA management. In all three MPAs, annual and biannual meetings were organized by the MPA management bodies, however such meetings were considered as only “*formalities*” by both community members and MPA managers, rather than real opportunities for communities to participate in MPA decision-making. Despite their lack of participation, over 40% of local community members indicated that they benefit from MPA management, and a further 23% indicated that MPAs do not have any impacts on their livelihoods. This is because (1) some community members are offered jobs as a result of tourism development; and (2) current MPA management in China mainly focuses on the control of commercial activities that may cause large-scale and irreversible ecological damages, traditional and small scale uses of resources practiced by local communities have not been subject to control (Chen, C-M., 2006).

There are challenges raised by a growing population and related pressures for rapid economic development, coupled with a lack of historical experience with public participation in governance decisions for the management of the MPA system (Qiu, W., *et al.*, 2009). The resident population size within a MPA in China typically ranges from a few thousand to over 10,000 (Qiu and McManus, unpublished data); in some MPAs it approaches 100,000, and local communities often rely heavily on coastal and marine resources for their livelihoods (Cui, F. and Liu, B-Y. 2006). In a country with a growing population and related pressures for rapid economic development, coupled with a lack of historical experience with public participation in governance decisions, decentralisation needs to be pursued carefully to enhance strategic conservation and empowerment of communities (Qiu, W. and Jones, P., 2009).

Most MNPs are short of funds, high-level personnel, advanced management, and a sound organisation system (Goodwin, H., 1996). In November 2000, the SOA East China Sea Bureau

carried out an inspection of the management of MNRs in the East China Sea area including three reserves: Jinshan Reserves in Shanghai; Xiamen Precious Species Protection Reserves in Fujian; and Longhai Mangrove Reserves in Fujian. The problems discovered during the inspection included: (a) the absence of a sound management mechanism; (b) a lack of professional knowledge on the part of the management personnel (SOA, 2000).

Due to overlapping management responsibilities, the marine conservation framework is quite inefficient, contributing to the damage of the marine species and their habitats. In some MNRs or marine national parks, there are different management organs established by different government departments, thus making management chaotic (Zhang, X. and Zhang X-Z., 2001; Zou, K., 2003). MNRs are classified identically as nature reserves of aquatic fauna and flora when they are established in coastal areas. Thus a problem of overlapping authority between the SOA and the Ministry of Agriculture (MOA) in the management of marine nature reserves arises (Zou, K., 2003). A major problem in the management of the MNRs is the coordination between/among different departments. As provided in the Regulations on Nature Reserves, the National Environmental Protection Agency (NEPA) is the competent authority in charge of the management of all nature reserves throughout the country. However, in terms of MNRs, the SOA is the competent authority. The question as to who has the superior authority remains open, and conflicts may arise between the two departments. This is clearly detrimental for effective management of the MNRs. Second, regulations laid down by different government departments produce overlapping authorities over the management of the MNRs. If a MNR is established due to the precious aquatic animals and plants found in the area, then who should be in charge of it: the SOA or the MOA? The situation becomes complicated if mangroves are included in the MNR: there would then be three government departments (or four, when NEPA is involved) that have authority over that MNR in accordance with their respectively adopted regulations. The division of authority, if not clear-cut, would be definitely unfavorable for the sound management of the MNRs. In this respect, the role of the State Council itself would be critical. For that reason, there is a call in China to unify the management of marine nature reserves. The SOA is recommended as the competent authority to manage all marine nature reserves and coordinate interdepartmental activities (Li, G., 1994).

Most *de jure* MNRs are implemented as *de facto* multiple-use areas, and certain levels of fishing and industrial activities are usually tolerated within them (Qiu, W., *et al.*, 2009). As a result of great user pressure and lack of enforcement capacity, the zoning schemes are often poorly recognized and implemented in protected areas in China (PATF, 2004). It has been a huge challenge to enforce MNRs in China because of the massive conflict between conservation and economic development, as well as insufficient investment on the enforcement of MNRs. The policy choice of establishing large areas of MNRs, which are in densely populated and heavily used areas in China, has partly ignored the social contexts of conservation (Qiu, W. *et al.*, 2009). Now, tourism is a common way for most MNRs to overcome financial difficulties. Tourism activities are generally planned and designed with a view to maximizing profits, which severely harms the ecosystems of MNRs. Many tourism facilities are constructed in scenic spots, which interfere with surrounding coastal and marine ecosystems (Goodwin, H., 1996). Tourism development is encouraged by the Development Programme for Marine Nature Reserves. However, such activities, while providing a source of funds for MNRs, may also threaten their viability (Zou, K., 2003).

In conclusion, many MPAs in China suffer from low management effectiveness, resulting from limited stakeholder involvement, insufficient investment, and major conflicts between

conservation objectives and socio-economic and political interests. Most MNRs are short of funds, high-level personnel, advanced management, and a sound organisation system.

### **Monitoring and evaluation of the MPAs**

There are four major components in monitoring MNRs: (a) surveillance: use of vehicles and equipment to observe and investigate living conditions of protected marine species and population trends, the area's environmental status and human activities; (b) law enforcement: use of laws to prevent violations, evidence collection, and reporting to competent authorities to punish law-breakers; (c) education about the laws relating to the MNRs; and (d) contingent protection: designed to deal with urgent incidents occurring within the MNRs and to provide protection for protected objects in the shortest possible time (Division of Personnel and Adult Education Centre, 1998a). The following should be subject to monitoring: (a) damage of mangroves; (b) damage of coral reefs; (c) damage of scenic forests and stones; (d) digging of sand without approval; and (e) illegal fishing (Division of Personnel and Adult Education Centre, 1998). There is lack of independent and objective monitoring and evaluation processes in the management of MPAs in China (Qiu, W., *et al.*, 2009). There are very few MPAs in China that have long-term monitoring programmes. However, since 2004, 18 ecological monitoring areas covering some MPAs have been established by the SOA to monitor the status of representative and fragile inshore ecosystems. These provide some indications on the status of ecosystems within some MPAs and the main threats they face. According to the 2007 monitoring data, most surveyed coral reef, mangrove, and sea-grass ecosystems in southern China remain healthy, while estuary and gulf ecosystems in heavily industrialized areas score low on the status of ecosystem health. Key threats to inshore ecosystems and MPAs include land-based pollution, mariculture, reclamation, and overexploitation (SOA, 2008). The SOA organized a self-evaluation on the management effectiveness of 27 MPAs in China. The results revealed several common problems in MPA management, including insufficient funding, particularly in locally designated MPAs, and the lack of long-term and systematic management planning, monitoring, and well-trained personnel (SOA, 2004).

In conclusion, there is lack of independent and objective monitoring and evaluation processes in the management of MPAs in China.

### **Database of marine nature reserves**

There is only information on MNRs on China Oceanic Information Network (COI, 2010), but no database of MPAs in China has been found.

### **Nature compensation**

Ecological compensation is as one of the two kinds of administrative punishment for any loss or damage to nature reserves (Articles 34, 35 and 38 of Regulations on Nature Reserves) (State Council, 1994).

A policy for ecological compensation fee was adopted in 17 regions during the last decade. This policy covers the exploitation of natural resources such as sea water, tourism (MEP, 1998a).

A special fund of the policy was established for local nature conservation and the restoration and rehabilitation of ecological environments (Xu, H., *et al.*, 1999).

In conclusion, nature compensation in China contains only financial compensation.

### **Problems in marine conservation**

There is not a comprehensive law on marine conservation. The Marine Environmental Protection Law addresses quite simply on marine conservation. The conservation of coastal wetlands is not covered in either of two laws - the Fishery Law and the Wildlife Protection Law which are related to marine conservation. Articles of marine conservation are scattered in related laws and regulations on marine environmental protection and marine resource; they are stipulated in principle but lack operability. Ambiguous responsibility and unreasonable penalization of violators also undermines the effectiveness and practicability of laws and regulations. For example, similar provisions pertaining to the protection of the marine and coastal ecosystems can be found in the 1994 Regulation on Nature Reserves and the Measures on the Management of Marine Nature Reserves with Article 20, 21 and 24 of the 1999 amended Law on Marine Environmental Protection (MEPL). This overlap may create difficulties in implementation.

Marine conservation involves a great number of administrative departments. The rights and duties of these administrative departments in charge have been clearly defined in laws and regulations, but there are no definite specifications on how to harmonise actions and relations between these departments, which often hinders them from playing an integrated role and becomes an obstacle to overall supervision and administration for marine conservation. Most administrative departments responsible for marine conservation are also in charge of marine resource management; this dual role often results in contradiction in the position of administrative departments of marine resources. Most laws and regulations on marine conservation are formulated from the perspective of economic value, emphasising the utilisation of marine resources rather than marine conservation. There are more rules about administrative responsibility, but less and incomplete ones about civil and criminal responsibilities. Moreover, in dealing with civil responsibility, attention is paid to compensation for damages rather than removal of damages and rehabilitation. The administrative interference, local protectionism, low awareness of marine conservation, insufficient public participation also influences the enforcement of laws and regulations on marine conservation.

The education on marine biodiversity is far from meeting the requirements of marine conservation in China. Higher education cannot meet the increasing demand for marine conservation in China (Xu, H., *et al.*, 1999).

In conclusion, there is not a comprehensive law on marine conservation; and law enforcement and education are far from meeting the requirements of marine conservation in China.

### **Conclusion**

The no-take marine nature reserves in China are the MNRs. The multiple-used special marine protected areas are SMPAs and marine nature areas refer to 'National Park of China'. Many action plans or projects on marine conservation in China's Agenda 21 have not been implemented due to insufficient funding. There are 158 MPAs, include 32 NMNRs and 114 Local-level MNRs in China now. The legislations and policies on no-take MNRs are Marine Environment Protection Law, Measures on the Management of Marine Nature Reserves, China's Ocean Agenda 21, the management plans of the MNRs, the Programme on Developing China's Marine Nature Reserves, et cetera. The regulation on multiple-used SMPAs is Interim Rule of Special Marine Protected Areas. Illegal killing, fishing, aquaculture and other damaging to the habitats in MNRs can be imposed a fine of up to RMB 10,000. Very often, the establishment of the MPAs falls into local governments. SOA is officially charged with the overall planning and supervision of the MPA system. There should be corresponding man-

agement organs equipped with professional and technical personnel for MNRs. There is increasing participation and influence of local governments and private sectors, but very limited involvement of local communities in the management of MPAs. There is lack of independent and objective monitoring and evaluation processes in the management of MPAs. A policy which covers the exploitation of natural resources for ecological compensation fee was adopted in 17 regions. There are problems on the legislations, administration and educations in marine conservation in China.

#### ***4.3 Differences in the current situation of marine habitat protection between the Netherlands and China***

This sub-chapter shows the differences in the current situation of marine habitat protection between the Netherlands and China (see Table 2 in Appendix II).

##### **No-take marine nature reserves (MNRs)**

No big difference of no-take marine nature reserves between the Netherlands and China has been found, since there are no-take marine nature reserves both in Netherlands and China.

##### **Multiple-use special marine protected areas (SMPAs)**

No marine nature area in National Landscapes in the Netherlands has been found. There are SMPAs (multiple-use special marine protected areas) in China. Therefore, the multiple-use special marine protected areas are different in the Netherlands than China.

##### **Implementation of legislations and policies on marine habitat protection**

No information on the implementation of legislations and policies on marine habitat protection in the Netherlands has been found to compare with China.

##### **Figures on marine protected areas (MPAs)**

No enough figures on the MPAs in the Netherlands have been found to compare with China.

##### **Legislations and policies on no-take MNRs**

In the Netherlands, Nature Conservation Act is special for the protection of habitats, including marine habitats. Marine Environment Protection Law, the most important law on marine habitat protection in China, is mostly about the pollution of marine environment. Marine habitat protection is only a small part of it. Therefore, the focus of the law which is related to marine habitat protection is different in the Netherlands than China.

No big difference in the regulations and policies on no-take marine nature reserves between the Netherlands and China has been found. There are legal systems and policies on marine nature reserves in both the Netherlands and China.

##### **Legislations and policies on multiple-use SMPAs**

No legislation or policy on National Park in China has been found to compare with the Netherlands. No marine nature area in National Landscapes in the Netherlands has been found for the comparison of relevant legislation or policy with 'Interim Rule of Special Marine Protected Areas' in China.

##### **Strict level of marine habitat protection**

No information on the punishment of damaging protected marine nature areas in the Netherlands has been found to compare with China.

No big difference in the requirements of preservation of protected marine nature reserves between the Netherlands and China has been found. Activities which harm marine nature reserves are prohibited in both the Netherlands and China.

#### **The establishment of the MPAs**

No information on the establishment of marine protected areas in the Netherlands has been found to compare with China.

#### **The management of the MPAs**

No information on conservation objectives of MNRs in China has been found to compare with the Netherlands. No information on the management of National Parks in China has been found to compare with the Netherlands.

No enough information on the problems in the management of marine nature reserve has been found in the Netherlands to compare with China.

#### **Monitoring and evaluation of the MPAs**

No information on the monitoring and evaluation of marine protected areas in the Netherlands has been found to compare with China.

#### **Database of marine nature reserves**

There are databases of different types of marine natures in the Netherlands. No database of MPAs in China has been found. Therefore, the database of marine nature reserves is different in the Netherlands than China.

#### **Nature compensation**

There is physical compensation in Green Space Structure Plan in the Netherlands. No physical compensation in China. Therefore, nature compensation is different in the Netherlands than China.

#### **Problems in marine conservation**

No information on the problems of legislations or law enforcement of marine conservation in the Netherlands has been found to compare with China.

No information on the problems of the education of marine biodiversity and conservation in the Netherlands has been found to compare with China.

#### **Conclusion**

The multiple-use special marine protected areas, the focus of the law which is related to marine habitat protection and nature compensation are different in the Netherlands than China.

### ***4.4 Conclusion of comparing the current situation of marine habitat protection between the Netherlands and China***

In the Netherlands, the no-take marine nature reserves are marine sites of Natura 2000 sites, and marine nature areas refer to ‘Nature Monuments’, ‘Special Protection Areas’ and ‘National Ecological Network’ (EHS). The multiple-use special marine protected areas are: marine nature areas refer to ‘National Parks’ (NPs). There are 16 marine sites of Natura 2000 sites in the Netherlands. The legislations and policies which are for no-take marine nature reserves are Nature Conservation Act, Natura 2000, the management plans of Natura 2000

sites, the EHS, Green Space Structure Plan, the permit system and spatial planning laws; for multiple-use special marine protected areas are annual subsidies for NPs. The duty of care and the permit system are for marine habitat protection. A management plan is required for each Natura 2000 site, and a dual approach was taken in formulating the Natura 2000 targets. There are databases of different types of marine natures in the Netherlands. The compensation is obliged for affecting marine areas which are part of the EHS or European protected marine nature areas.

The no-take marine nature reserves in China are the MNRs. The multiple-used special marine protected areas are SMPAs and marine nature areas refer to 'National Park of China'. Many action plans or projects on marine conservation in China's Agenda 21 have not been implemented due to insufficient funding. There are 158 MPAs, include 32 NMNRs and 114 Local-level MNRs in China now. The legislations and policies on no-take MNRs are Marine Environment Protection Law, Measures on the Management of Marine Nature Reserves, China's Ocean Agenda 21, the management plans of the MNRs, the Programme on Developing China's Marine Nature Reserves, et cetera. The regulation on multiple-used SMPAs is Interim Rule of Special Marine Protected Areas. Illegal killing, fishing, aquaculture and other damaging to the habitats in MNRs can be imposed a fine of up to RMB 10,000. Very often, the establishment of the MPAs falls into local governments. SOA is officially charged with the overall planning and supervision of the MPA system. There should be corresponding management organs equipped with professional and technical personnel for MNRs. There is increasing participation and influence of local governments and private sectors, but very limited involvement of local communities in the management of MPAs. There is lack of independent and objective monitoring and evaluation processes in the management of MPAs. A policy which covers the exploitation of natural resources for ecological compensation fee was adopted in 17 regions. There are problems on the legislations, administration and educations in marine conservation in China.

The multiple-use special marine protected areas, the focus of the law which is related to marine habitat protection and nature compensation are different in the Netherlands than China.

## **5 Comparing the current situation of bycatch between the Netherlands and China**

This chapter compares the current situation of bycatch, including legislations and policies on bycatch, cetacean, invertebrates, fish, seabird, shark, and sea turtle bycatch, and bycatch impact on marine ecosystem, between the Netherlands and China, and shows the differences wherein.

### **5.1 Current situation of bycatch in the Netherlands**

This sub-chapter shows the current situation of bycatch, including legislations and policies on bycatch, cetacean, invertebrates, fish, seabird, shark, and sea turtle bycatch, and bycatch impact on marine ecosystem, in the Netherlands.

#### **Legislations and policies on bycatch**

Under 'EU Council Regulation 812/2004, of 26 April 2004, laying down measures concerning incidental catches of cetaceans in fisheries and amending Regulation (EC) no 88/98' (EC, 2004), 10% of the fleet effort in pelagic fishery in the period of 1 December till 31 March in ICES area VI, VII and VIII (fleet segment A and C) has to be covered, and outside this area in all areas year round (fleet segment B and D) in European waters, 5% should be covered. In the Dutch situation the monitoring is integrated with the collection of discards data under the EC Data Collection Regulations 1543/2000 (EC, 2000) and 1639/2001 (EC, 2001).

No provincial regulation on fishing discard in the Netherlands has been found.

No provincial regulation on turtle bycatch in the Netherlands has been found.

In conclusion, there are regulations on bycatch monitoring and data collection in the Netherlands.

#### **Cetacean bycatch**

Stranding data and recorded post-mortem findings were studied for 153 Harbour Porpoises (*Phocoena phocoena*), which were collected by the Seal Rehabilitation and Research Centre (SRRC; Pieterburen, the Netherlands) in the period 1984–2006. Special consideration was given to 'bycatch' listed as a major cause of death. A distinct increase in the numbers of stranding porpoises along the Dutch coastline has occurred in the recent years of the studied period (Osinga, N., *et al.*, 2008). There are estimated annual harbour porpoises bycatch of 10.84 by demersal trawlers; and 3.75 by bottom-set gillnets. Thus the annual number of Harbour Porpoise bycatch for the whole Dutch fishery is around 15 (Osinga, N. *et al.*, 2009).

There were estimated bycatch of 37 Harbour Porpoises and 37 Grey Seals (*Halichoerus grypus*,) by trammel nets in cod/mixed species fishery from October till June in 2008 (Couperus, A.S., 2009).

There were dozens of cetacean bycatch, such as Short-beaked Common Dolphins (*Delphinus delphis*), by Dutch pelagic trawlers from July 2004 till December 2005. Comparison with earlier bycatch numbers of the period 1993-1996, indicates a large inter-annual variability: in some years the bycatch numbers can be as high as several hundred (Couperus, A.S., 2006).

There were cetacean bycatch of less than 10, such as the Atlantic White-sided Dolphin (*Lagenorynchus acutus*), by Dutch pelagic trawlers in 2006, (Couperus, A.S., 2007).

In conclusion, there are cetacean bycatch of Harbour Porpoises, Grey Seals, Short-beaked Common Dolphins, and Atlantic White-sided Dolphin in Dutch fisheries.

### **Invertebrates and fish bycatch**

In the south-eastern North Sea between 1945 and 1983, there were bycatch of 7 fishes (sharks, rays, skates) and 10 invertebrate species (whelks, urchins, squids, crabs) in otter and beam trawlers fishery; where invertebrate bycatch of velvet swimming crab, slender spindle shell in beam trawlers (Philippart, C. J. M., 1997). No figure of the quantity of invertebrates and fish bycatch in Dutch fisheries has been found.

### **Discard**

The most frequently discarded species in the Dutch pelagic fishery in 2002 was mackerel, of which around 50% of the catch was discarded (Couperus, A.S., *et al.*, 2004). From the discard sampling programme on the Dutch pelagic trawl fisheries in the North East Atlantic in the period 2003-2007, the overall discard percentage raised to fleet level was highest in 2003 (17%), and appears to be considerably lower (6%-8%) for the following years (2004-2007). Besides the discards which are sorted by the crew, it occasionally happens that part of or the total catch is discarded before the catch has been sorted, an incident referred to as "slippage". The discard composition and length frequency data shown above are therefore only based on routinely sorted discards. Accounting for a relative large part of the total annual discard estimates (17%-40% in weight), incidents of slippage are not frequently observed during the sampled trips between 2003 and 2007 (4%-8% of the sampled hauls). Discard percentages of the target species herring, horse mackerel and blue whiting (within the season) are relatively low (1%-6%). For mackerel the discard percentages appear to be significantly higher (16%-37% in the period 2003-2007). Boarfish is the most discarded non-commercial species. The present study suggests that, with the exception of mackerel, discarding of target species on an annual level (includes discard data of season) in the pelagic freezer fleet is low, concluding that this fishery has a high level of efficiency when targeting fish (Helmond, A.T.M. van and Overzee, H.M.J. van, 2009b).

A discards sampling programme of the Dutch fishery for Nephrops in the North Sea was carried out in 2007 and 2008. This study shows that discards rates of Nephrops were high in the sampled trips and varied between 44%-79% in numbers and 32%-61% in weight. As well in numbers as in weight discards of Nephrops are higher than for all other species. Most Nephrops discards were larger than the minimum landing size indicating that there are problems with the market for 'smaller' individuals or problems with the quota. Besides Nephrops, the amount of bycatch of other benthos species in this fishery was much lower in comparison with observations in the Dutch beam trawl fishery. This is due to the different gears used in both fisheries. There is bycatch of flatfish and round-fish in this fishery. Dab was the most abundant fish species in the catch in all trips. Most of the dab is discarded because it undersized or has no or low economic value. Plaice was the most important bycatch in the landings. The absolute amount of discards per hour in the Nephrops fishery is much lower than for the beam trawlers. However, the calculated percentage discarded for plaice and dab are the same as in the beam trawl fishery (Helmond, A.T.M. van and Overzee, H.M.J. van, 2009a).

A discards sampling program on the Dutch beam trawl fishery in the North Sea was carried out in 2008. The average percentage discards for sole was estimated at 16% in numbers and

6% in weight for the sampled vessels. This is the lowest discard rate observed for sole since 2002. Higher discard rates in previous years were caused by the strong year class of 2005. In 2008 this year class has reached marketable lengths and explains the drop in discard rates compared to the previous years, when year class 2005 was still abundant in the discarded part of the catch. The estimated discard rate for plaice in the sampled trips in 2008 is estimated at 84% in numbers and 53% in weight. Although variation between observed trips is high, the average discard rate is within the range as previous years, between 76% en 86%. Through time dab has been the most abundant species in the fish discards. Since 1976 the discard estimate of this species in numbers has varied between 91% and 99%. Also in 2008 the estimated discard rate, 95%, is within this range (Helmond, A.T.M. van and Overzee, H.M.J. van, 2010).

In conclusion, there are extreme high ratios of discards in Dutch fisheries.

#### **Seabird bycatch**

No information on seabird bycatch in the Netherlands has been found.

#### **Shark bycatch**

No information on shark bycatch in the Netherlands has been found.

#### **Sea turtle bycatch**

No information on sea turtle bycatch in the Netherlands has been found.

#### **Bycatch impact on marine ecosystem**

Because of the bycatch, the bottom fisheries in the south-eastern North Sea had a considerable impact on several demersal fish and benthic invertebrates (Philippart, C. J. M., 1997).

### **Conclusion**

Legislations and policies on bycatch, which are applied in the Netherlands, are EU Council Regulation 812/2004 on cetacean bycatch and EC Data Collection Regulations 1543/2000. It suggests that there are annually dozens of cetacean bycatch, including harbour porpoises, grey seals and common dolphins, in Dutch trawlers and bottom-set gillnets. In the south-eastern North Sea between 1945 and 1983, there were bycatch of 7 fishes and 10 invertebrate species in otter and beam trawlers fishery. In the Dutch pelagic trawl fishery, the most frequently discarded species was mackerel in 2002; mackerel discard percentages appear to be significantly higher (16%-37%) in the period 2003-2007, and boarfish is the most discarded non-commercial species. In 2007 and 2008, discards rates of Nephrops were higher than for all other species, between 44%-79% in numbers and 32%-61% in weight in the Dutch Nephrops fishery in the North Sea. In 2008, the average percentage discards for sole was estimated at 16% in numbers and 6% in weight; for plaice at 84% in numbers and 53% in weight in the Dutch beam trawl fishery in the North Sea. Dab has been the most abundant species in the fish discards, which has varied between 91% and 99% in numbers since 1976. Because of the bycatch, the bottom fisheries in the south-eastern North Sea had a considerable impact on several demersal fish and benthic invertebrates.

## **5.2 Current situation of bycatch in China**

This sub-chapter shows the current situation of bycatch, including legislations and policies on bycatch, cetacean, invertebrates, fish, seabird, shark, and sea turtle bycatch, and bycatch impact on marine ecosystem, in China.

### **Legislations and policies on bycatch**

The long-line onboard observer programme in Chinese fishery in the Pacific Ocean began since 2003 (Dai, X-J and Zhu, J-F, 2008).

The IATTC Resolution C-05-01 on incidental mortality of seabirds (IATTC, 2005) calls for the Stock Assessment Working Group to provide an assessment of the impacts of bycatch on seabird populations, the first step of which is to provide a total estimate of seabird bycatch rates within IATTC fisheries (Orea, A., 2009), including Chinese fishery, since China is a member of Inter-American tropical tuna commission (IATTC) (IATTC, 2010).

The disposal of bycatch discards in the fishing water is illegal (Fishing Regulations in Guangdong) (Oceanic and Fishery Administration of Guangdong Province, 2007).

All turtle bycatch should be released immediately (Rule of Guangdong Sea Turtle Resources Protection) (Guangdong Provincial Government, 1988).

In conclusion, there are regulation and policy on bycatch monitoring and data collection in China.

### **Cetacean bycatch**

Finless porpoises (*Neophocaena phocaenoides*) (Vulnerable) (IUCN Red List, 2008h) are probably killed in considerable numbers; recorded incidental catches suggested that dozens, perhaps hundreds, have been caught annually in gillnets, driftnets, trammel nets, stow nets and pound nets along the coasts of Liaoning, Hebei, Shandong, Jiangsu and Fujian provinces. Finless porpoises are known to be taken in various gillnet fisheries throughout their range (Zhou, K. and Wang, X., 1994; Jefferson, T. A. and Curry, B. E., 1994).

There are some reports about Chinese white dolphin (*Sousa chinensis*) (Near Threatened) (IUCN Red List, 2008a) bycatch in fishing and stranding in the coastal waters in recent years (Wang, P-L and Han, J-B, 2007). Other cetacean bycatch in Chinese fisheries are False Killer Whales (*Pseudorca crassidens*) (Data Deficient) (IUCN Red List, 2008i), Indo-Pacific Bottlenose Dolphins (*Tursiops aduncus*) (Data Deficient) (IUCN Red List, 2008j) and Common dolphins, including Short-beaked Common Dolphin (*Delphinus delphis*) (Least Concern) (IUCN Red List, 2008f) and Long-beaked Common Dolphin (*Delphinus capensis*) (Data Deficient) (IUCN Red List, 2008k), probably also other species (Zhou, K. et al. 1995).

In conclusion, there are cetacean bycatch of annually dozens of Finless porpoises and other Dolphin species in Chinese fisheries.

### **Invertebrates and fish bycatch**

Since the 1970s, there were bycatch of Lake Anchovy (*Coilia ectenes*), Tapetail Anchovy (*Coilia mystus*), juvenile fishes, shrimps and crabs in Japanese eel fishery. By 1990, trash fish and low value fish, including juveniles of commercial species, were already estimated by Chinese fisheries specialists to account for 70 percent of China's marine catch (Wang, S. and Zhan, B-Y, 1992). Monitoring of catch composition in the East China Sea in 1994 showed that this percentage had increased to 90 percent of the catch of the large-head hair-tail (*Tri-chiurus lepturus*), one of the major commercial species of the catch composition in the past (Qian, Z. and Yang, N., 1998; Zhong, Y. and Power, G., 1997). The shrimp fishery of China catches about 1.8 million tonnes of bycatch (Zhou, Y. and Yimin, Y., 1996). In 2003, there

was a catch of low value and trash fish of 2,160,000 tonnes, out of a total marine catch of 9,730,000 tonnes in China. In 2004, there was a catch of about 3.3 million tonnes of low value and trash fish (Grainger, R., et al., 2005).

In conclusion, invertebrate and fish bycatch increase dramatically in Chinese fisheries since 1970s.

### **Discard**

Chinese shrimp trawl fleets discard very little non-shrimp catches. All the bycatch is used, much for feeds for the Chinese aquaculture industry (Zhou, Y. and Yimin, Y., 1996). In S E Asia there has also been a growth in recent years in industry's which use bycatch from shrimp fisheries for human consumption (Chee, P. E., 1996).

In conclusion, there is very little discard in Chinese fisheries.

### **Seabird bycatch**

In 2003, there were total estimated seabird bycatch 866 individuals in Chinese industrial pelagic long-line tuna fishery (Dai, X., et al., 2006).

### **Shark bycatch**

The shark bycatch species by set gillnets and drift-nets are *S. lewini*, *Hypoprion macloti*, *Carcharias latistomus*, *Carcharias pleurotaenia*, *Carcharhinus menisorrah* and *Carcharhinus sorrah*. Where shark are abundant they comprise perhaps 30 percent of the total catch but in waters with fewer sharks the proportion is very small. The shark bycatch species by trawlers are mainly *C. sorrah*, *C. menisorrah*, *Scoliodon spp*, *Sphyrnidae*, *Chiloscyllium spp* and occasionally big *Rhincodon typus* and *Cetorhinus maximus*. It is estimated that shark bycatch of trawling amounts to 70-80 percent of total shark landings (Vannuccini, S. 1999). There were shark bycatch of silky shark, while short-fin mako, long-fin mako, crocodile shark, velvet dogfish in Chinese long-line pelagic fishery in 2008 (Dai, X-J and Zhu, J-F, 2008).

### **Sea turtle bycatch**

There was sea turtle bycatch of Leatherback (*Dermochelys coriacea*) (Critically Endangered) (IUCN Red List, 2000) in Chinese long-line pelagic fishery in 2008 (Dai, X-J and Zhu, J-F, 2008). But critically endangered Leatherback is not on National Wildlife Protection List (SFA, 1989).

### **Bycatch impact on marine ecosystem**

The juveniles of fishes, shrimps and crabs which are caught by eel nets are important parts of the food chain in the Yangtze estuary. They are prey for *Leiocassis longirostris*, *Lateolabrax japonicus*, *Psephurus gladius* and endangered Chinese sturgeon (*Acipenser sinensis*), as well as other commercial and rare fishes. Therefore, a great number of juvenile bycatch of these species in eel fishing will also cause adverse effects on the growth of these commercial and rare fishes (Zhang, H., et al., 2007).

### **Conclusion**

Legislations and policies on bycatch applied in China are the long-line onboard observer programme, the IATTC Resolution C-05-01, et cetera. There are cetacean bycatch of annually dozens of Finless porpoises and other Dolphin species in Chinese fisheries. There were higher than 70 percent of trash and low value fish and invertebrate bycatch in Chinese fisheries

since 1970s. There is little discard in Chinese fishery. There were 866 seabird bycatch in Chinese pelagic fishery in 2003. There are a number of species of shark bycatch, with 30 percent by set gillnets and drift-nets and 70-80 percent by trawlers. There was leatherback turtle bycatch in Chinese pelagic fishery in 2008. Eel fishery has big impact on marine ecosystem in the Yangtze estuary.

### **5.3 Differences in the current situation of bycatch between the Netherlands and China**

This sub-chapter shows the differences in the current situation of bycatch between the Netherlands and China (see Table 3 in Appendix II).

#### **Legislations and policies on bycatch**

No big difference in the legislations or policies on bycatch between the Netherlands and China has been found, since there are legislations and policies on monitoring and data collecting both in the Netherlands and China.

No provincial regulation on fishing discard in the Netherlands has been found.

No provincial regulation on turtle bycatch in the Netherlands has been found.

#### **Cetacean bycatch**

In Dutch fisheries, cetacean bycatch species - Harbour Porpoise (*Phocoena phocoena*), Grey Seal (*Halichoerus grypus*), Short-beaked Common Dolphin (*Delphinus delphis*), and Atlantic White-sided Dolphin (*Lagenorynchus acutus*), are under the category of 'Least Concern' on the IUCN Red List. In Chinese fisheries, cetacean bycatch species - Finless porpoise (*Neophocaena phocaenoides*), is under the category of 'Vulnerable'; and Chinese white dolphin (*Sousa chinensis*), 'Near Threatened' on the IUCN Red List. Therefore, the conservation statuses of cetacean bycatch species are different in Dutch fisheries than Chinese fisheries.

#### **Invertebrates and fish bycatch**

There is lack of figures of the quantity of invertebrates and fish bycatch in Dutch fisheries to compare with Chinese fisheries.

#### **Discard**

There are extreme high ratios of discards in Dutch fisheries. There is very little discard in Chinese fisheries. Therefore, the quantities of the discards are different in Dutch fishery than Chinese fishery.

#### **Seabird bycatch**

No information on seabird bycatch in the Netherlands has been found to compare with China.

#### **Shark bycatch**

No information on shark bycatch in the Netherlands has been found to compare with China.

#### **Sea turtle bycatch**

No information on sea turtle bycatch in the Netherlands has been found to compare with China.

#### **Bycatch impact on marine ecosystem**

No big difference in the impact of bycatch on marine ecosystems between the Netherlands and China has been found, since there are big impact of bycatch on marine ecosystems both in the Netherlands and China.

### **Conclusion**

The conservation statuses of cetacean bycatch species and the quantities of the discards are different in Dutch fishery than Chinese fishery.

#### ***5.4 Conclusion of comparing the current situation of marine habitat protection between the Netherlands and China***

Legislations and policies on bycatch, which are applied in the Netherlands, are EU Council Regulation 812/2004 on cetacean bycatch and EC Data Collection Regulations 1543/2000. It suggests that there are annually dozens of cetacean bycatch, including harbour porpoises, grey seals and common dolphins, in Dutch trawlers and bottom-set gillnets. In the south-eastern North Sea between 1945 and 1983, there were bycatch of 7 fishes and 10 invertebrate species in otter and beam trawlers fishery. In the Dutch pelagic trawl fishery, the most frequently discarded species was mackerel in 2002; mackerel discard percentages appear to be significantly higher (16%-37%) in the period 2003-2007, and boarfish is the most discarded non-commercial species. In 2007 and 2008, discards rates of Nephrops were higher than for all other species, between 44%-79% in numbers and 32%-61% in weight in the Dutch Nephrops fishery in the North Sea. In 2008, the average percentage discards for sole was estimated at 16% in numbers and 6% in weight; for plaice at 84% in numbers and 53% in weight in the Dutch beam trawl fishery in the North Sea. Dab has been the most abundant species in the fish discards, which has varied between 91% and 99% in numbers since 1976. No information on seabird, shark and sea turtle bycatch in the Netherlands has been found. Because of the bycatch, the bottom fisheries in the south-eastern North Sea had a considerable impact on several demersal fish and benthic invertebrates.

Legislations and policies on bycatch, which are applied in China, are the long-line onboard observer programme, the IATTC Resolution C-05-01, et cetera. Cetacean bycatch in Chinese fisheries are dozens of finless porpoises, Chinese white dolphins and other species. There were higher than 70 percent of trash and low value fish and invertebrate bycatch in Chinese fisheries since 1970s. There is little discard in Chinese fishery. There were 866 seabird bycatch in Chinese pelagic fishery in 2003. There are a number of species of shark bycatch, with 30 percent by set gillnets and drift-nets and 70-80 percent by trawlers. There was leatherback turtle bycatch in Chinese pelagic fishery in 2008. Eel fishery has big impact on marine ecosystem in the Yangtze estuary.

The conservation statuses of cetacean bycatch species and the quantities of the discards are different in Dutch fishery than Chinese fishery.

## **6 Comparing the current situation of marine conservation awareness between the Netherlands and China**

This chapter compares the current situation of marine conservation awareness, including marine conservation awareness of the public, NGOs and the stakeholders of the fisheries, between the Netherlands and China, and shows the differences wherein.

### ***6.1 Current situation of marine conservation awareness in the Netherlands***

This sub-chapter shows the current situation of marine conservation awareness, including marine conservation awareness of the public, NGOs and the stakeholders of the fisheries, in the Netherlands.

#### **The public**

The attitudes of seafood consumers on sustainable seafood reflect marine conservation awareness of the public on sustainable fishery. Seafood consumers in the Netherlands are willing to contribute to sustainably fishery by purchasing sustainable seafood products. According to the marketing research on the attitudes of consumers toward sustainable seafood by the Seafood Choices Alliance with the cooperation of the North Sea Foundation, Greenpeace and WWF, more than half of the consumers are aware of turtle and dolphin bycatch and overfishing in general. More consumers are concerned about overfishing (78%) than bycatch (67%), but they consider both issues important in making seafood purchases. About one third of the consumers purchase ‘Dolphin Safe Tuna’, and avoid “hard-discount” stores since that ‘cheap’ fish is “bad” fish, and farmed salmon. Up to 50% of consumers have avoided buying seafood that they know is not sustainable. Most of the consumers purchase seafood in large supermarkets, since they give broad permission for retailers to source sustainably and educate consumers about better choices. Consumers want more information on sustainable seafood and point of purchase labelling. They also want government and retailers to bear most of the responsibility for providing sustainable choices (Seafood choices Alliance, 2010).

Besides the attitude of seafood consumers, the attitudes of seafood suppliers also reflect marine conservation awareness of the public on sustainable fishery. Individual retailers in the Netherlands, such as Albert Heijn, Super de Boer, C1000, Plus, Jumbo, DEEN, Dekamarkt, Dirk van den Broek, are actively seeking MSC (Marine Stewardship Council) certified seafood products (MSC, 2010c). MSC labelled fish products are sold in most of the supermarkets in the Netherlands (MSC, 2010b). Several of the larger suppliers of foodservice sector in the Netherlands like Seafood Parlevliet have obtained MSC Chain of Custody certification and have launched products bearing the MSC label. Dutch airline Royal KLM is the first airline in the world to serve MSC-certified seafood. Dutch contract caterer Sodexo has obtained MSC Chain of Custody certification. Umoja restaurant in Amsterdam has been certified for MSC Chain of Custody. As well as 6 more independent restaurants, including Jamie Oliver’s Fifteen and the first fish restaurant De Parel van Vreeswijk in Nieuwgein (MSC, 2010c).

No information on the awareness of fishermen or local communities on the regulations of marine protected areas has been found.

No information on the awareness of the public on the function and performance of protected areas in the Netherlands has been found.

In conclusion, the public in the Netherlands is willing to contribute to sustainable fishery.

### **NGOs**

The projects on marine conservation, such as cetacean bycatch reduction and sustainable fishery from NGOs reflect marine conservation awareness of NGOs. Kust en Zee has started the Dolphin Saver project for reducing cetacean bycatch in Dutch fishery (K&Z, 2010). The campaign 'Sustainable seafood on the menu' was launched in January 2010 by WWF Netherlands and the Royal Restaurant Association. The launch of a pilot for online MSC Chain of Custody certification for independent restaurants is part of the campaign (MSC, 2010c). The North Sea Foundation (Stichting Noord Zee) has published the fourth edition of the Fish Guide with the cooperation with WWF (Goede VIS, 2010a). Its Goede VIS project is to promote 'Green fish'. This project including informing the public which supermarkets, restaurants and other places selling sustainable fish (Goede VIS, 2010b), and providing the recipes with sustainable fish (Goede VIS, 2010c).

In conclusion, NGOs in the Netherlands are willing to contribute to cetacean bycatch reduction and sustainable fishery.

### **Fishery stakeholders**

MSC certification programme is an important step for the fishery to become sustainable. It reflects the marine conservation awareness of the stakeholders of the fishery to achieve MSC certification for the fishery and related seafood exporters and processors. Many Dutch fisheries have achieved MSC certification, such as North Sea herring fishery, Ekofish Group North Sea plaice fishery, North East Atlantic mackerel fishery, et cetera. Over 140 of the 400-plus exporters and processors in the Netherlands have obtained MSC Chain of Custody certification (MSC, 2010c).

The cooperation of fishermen organisations with NGOs on cetacean bycatch reflects marine conservation awareness of fishermen. Dutch fishermen organisation 'Nederlandse Vissersbond' works together with Kust en Zee on Dolphin Saver testing for reducing cetacean bycatch in Dutch fishery (K&Z, 2010).

The attitudes of fishermen towards sustainable fishery also reflect their marine conservation awareness. The fishermen from the Integrated Fisheries Foundation (Stichting Geïntegreerde Visserij) see the sustainable fishery as the only future for the fishery, which in their eyes is small-scale coastal fishery with a quality and a wider variety of fish, crustaceans and shellfish. They want to gain more science and research knowledge about different ways of fishing and other species by exchanging experiences with other stakeholders. They want to work together with others in practical pilot projects to reach their vision of the future fishery (The Integrated Fisheries Foundation, 2010).

In conclusion, the stakeholders of Dutch fishery are willing to contribute to sustainably fishery.

### **Conclusion**

There are projects on cetacean bycatch reduction, like the Dolphin Saver project from Kust en Zee, and sustainable fishery, like campaign 'Sustainable seafood on the menu' from WWF Netherlands and the Royal Restaurant Association, Goede VIS project and the Fish Guide from the North Sea Foundation in the Netherlands. Seafood consumers in the Netherlands are aware of the impact of turtle and dolphin bycatch, and want to contribute sustainable fishery

by purchasing ‘Green Fish’, such as ‘dolphin safe’ tuna. Most of the supermarkets like Albert Heijn, Super de Boer, C1000, et cetera, large seafood suppliers like Seafood Parlevliet, and restaurants like Umoja, in the Netherlands sell MSC labelled fish products. Many Dutch fisheries and seafood exporters and processors have achieved MSC certification. Dutch fishermen organisation ‘Nederlandse Vissersbond’ works together with Kust en Zee on Dolphin Saver testing for reducing cetacean bycatch in Dutch fishery. The fishermen from the Integrated Fisheries Foundation (Stichting Geïntegreerde Visserij) are willing to contribute to sustainable fishery.

## ***6.2 Current situation of marine conservation awareness in China***

This sub-chapter shows the current situation of marine conservation awareness, including marine conservation awareness of NGOs, the public and the stakeholders of the fisheries in China.

### **NGOs**

The projects on marine conservation, such as cetacean bycatch reduction and sustainable fishery from NGOs reflect marine conservation awareness of NGOs. No project on cetacean bycatch reduction or sustainable fishery from NGOs in China such as WWF (WWF China, 2010), Greenpeace (Greenpeace China, 2010) or Friends of Nature (FON China, 2010) has been found.

In conclusion, the awareness of NGOs on marine conservation is low in China.

### **The public**

The attitudes of the public towards shark fishing and whaling reflect its marine conservation awareness. The public in China supports shark fishing, the fishermen in Hainan Province are praised for shark fishing (hinews, 2009), despite the fact that shark fishing is illegal (zhidao.baidu.com, 2010). Many people, even some fishing inspectors from the government, do not know the prohibition of the legislation on shark fishing (Wang, Y., 2007). China has always chosen to support whaling in IWC conferences since 2000. The public in China supports whaling, and regards it good for marine resources, suitable for Chinese own situation and resists other countries stopping China from whaling (Lanyaya, 2010).

The market of sustainable seafood also reflects marine conservation awareness of the public. Some MSC labelled fish products which are from the companies in other countries for sale in China, but no information on Chinese retailers which are involved in the sale of MSC labelled fish products has been found (MSC, 2010e).

The awareness of MPA (marine protected areas) regulations was extremely low amongst local communities in China. According to 69 semi-structured interviews with representatives of key stakeholder groups from the selected MPAs in the programme of policy analysis coupled with three in-depth case studies of MPAs in China, including fishermen and other community members, tourism operators, industrial developers and local governments, as well as NGOs, scientists and decision-makers at various levels, not a single local fisherman interviewed was aware of the fact that he was fishing in an officially no-take area. When the MPA regulations were explained to them, 95% of the fishermen expressed that completely eliminating fishing from MPAs was unfair and unrealistic, a view that was also shared by MPA enforcers and managers. One MPA manager pointed out that under the current circumstances, even inform-

ing local communities of the official MPA regulations would potentially cause “*waves of opposition*” and is counter-productive to MPA management (Qiu, W. and Jones, P. 2009).

The awareness of the public on the function and performance of protected areas is very low. A nation-wide survey in 2005 showed that only 18.1% of the 4,120,517 people surveyed believed that protected areas helped to improve environmental quality (ACEF, 2005).

In conclusion, the awareness of the public on marine conservation is low in China.

### **Fishery stakeholders**

MSC certification programme is an important step for the fishery to become sustainable. It reflects the marine conservation awareness of the stakeholders of the fishery to achieve MSC certification for the fishery. There is no MSC certified Chinese fishery (MSC, 2010d).

The attitudes of fishermen towards cetacean and turtle bycatch indicate their awareness on marine conservation. Incidentally captured small cetaceans did not occupy an important place in the daily life of people in coastal China, and they were discarded in the sea or sold at a very low price in fish markets (Yang, G., *et al.*, 1999). Usually the carcasses of entangled Finless porpoises are sold to local people for use as livestock feed (Zhou, K. *et al.* 1995). The fishermen sell sea turtle bycatch to the restaurants or aquaria (Zhangpuxiaoyu, 2010; news.zj.com, 2007).

The attitudes of fishermen towards fishery policies which contribute sustainable fishery also reflect their awareness on marine conservation. In order to control the increase of fishing effort and protect the blasted marine fishery resources, the central government in China has issued Summer Closed Fishing Season System in 1995 (Gao, J., 2006). But some fishermen go on fishing protected fish species in Summer Closed Fishing Season, because the price of fresh fish is higher, according to secretly interviewing fishermen at the beginning of summer closed fishing season in Weihai City (bbwfish.com, 2005). According to an interview done by World Fishing with a fisheries trade officer at a Western embassy in Beijing, the Fisheries Bureau in China has not started a quota on coastal fish capture unlike the EU's quota arrangement. Sometimes there is a planned quota but the challenge is how to organise the system. Fishing industry policy is not only made by the Fisheries Bureau but must involve the local community. They cannot introduce a quota without that (World fishing, 2009).

In conclusion, the awareness of fishery stakeholders on marine conservation is low in China.

### **Conclusion**

In China, no project on cetacean bycatch reduction or sustainable fishery from NGOs in China has been found. The public is not aware that shark fishing is illegal, and supports shark fishing and whaling. The awareness of MPA (marine protected areas) regulations was extremely low among local communities in China. The awareness of the public on the function and performance of MPAs is very low. There is no MSC certified Chinese fishery. Chinese fishermen discard or sell cetacean and sea turtle bycatch. They do not well follow fisheries policies which contribute to sustainable fisheries, such as Summer Closed Fishing policy and fishing quota arrangement.

### ***6.3 Differences in the current situation of marine conservation awareness between the Netherlands and China***

This sub-chapter shows the differences in the current situation of marine conservation awareness, including which of NGOs, the public and fishery stakeholders, between the Netherlands and China (see Table 4 in Appendix II).

#### **NGOs**

There are projects on cetacean bycatch reduction, like the Dolphin Saver project from Kust en Zee, and sustainable fishery, like campaign 'Sustainable seafood on the menu' from WWF Netherlands and the Royal Restaurant Association, Goede VIS project and the Fish Guide from the North Sea Foundation in the Netherlands. No project on cetacean bycatch reduction or sustainable fishery from NGOs in China has been found. Therefore the awareness of NGOs on cetacean bycatch reduction and sustainable fishery in the Netherlands is different from China.

#### **The public**

Seafood consumers in the Netherlands are aware of the impact of turtle and dolphin bycatch, and want to contribute to sustainable fishery by purchasing 'Green Fish', such as 'dolphin safe' tuna. This fact reflects the attitude of the public in the Netherlands towards sustainable fishery. In China, the public is not aware that shark fishing is illegal, and supports it; the public regards whaling good, and support it. These two facts reflect the attitude of the public in China towards sustainable fishery. Therefore, the attitude of the public towards sustainable fishery in the Netherlands is different from China.

No information on Chinese retailers which are involved in the sale of MSC labelled fish products has been found to compare with the Netherlands.

No information on the awareness of fishermen or local communities on the regulations of marine protected areas in the Netherlands has been found to compare with China.

No information on the awareness of the public on the function and performance of protected areas in the Netherlands has been found to compare with China.

#### **Fishery stakeholders**

Many Dutch fisheries, exporters and processors in the Netherlands have achieved MSC certification. There is no MSC certified Chinese fishery. Therefore, the attitudes of the stakeholders of Dutch fishery towards MSC certification programme are different than which of Chinese fishery.

The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on cetacean bycatch to compare with the attitudes of Chinese fishermen on cetacean bycatch.

No information on the attitude of Dutch fishermen on sea turtle bycatch has been found to compare with Chinese fishermen.

The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on sustainable fishery to compare with the attitudes of Chinese fishermen on sustainable fishery.

## **Conclusion**

The awareness of NGOs on cetacean bycatch reduction and sustainable fishery, the attitude of the public towards sustainable fishery, and the attitudes of fishery stakeholders towards MSC certification programme in the Netherlands are different from China.

### ***6.4 Conclusion of comparing the current situation of marine conservation awareness between the Netherlands and China***

There are projects on cetacean bycatch reduction, like the Dolphin Saver project from Kust en Zee, and sustainable fishery, like campaign 'Sustainable seafood on the menu' from WWF Netherlands and the Royal Restaurant Association, Goede VIS project and the Fish Guide from the North Sea Foundation in the Netherlands. Seafood consumers in the Netherlands are aware of the impact of turtle and dolphin bycatch, and want to contribute sustainable fishery by purchasing 'Green Fish', such as 'dolphin safe' tuna. Most of the supermarkets like Albert Heijn, Super de Boer, C1000, et cetera, large seafood suppliers like Seafood Parlevliet, and restaurants like Umoja, in the Netherlands sell MSC labelled fish products. Many Dutch fisheries and seafood exporters and processors have achieved MSC certification. Dutch fishermen organisation 'Nederlandse Vissersbond' works together with Kust en Zee on Dolphin Saver testing for reducing cetacean bycatch in Dutch fishery. The fishermen from the Integrated Fisheries Foundation (Stichting Geïntegreerde Visserij) are willing to contribute to sustainable fishery.

In China, no project on cetacean bycatch reduction or sustainable fishery from NGOs in China has been found. The public is not aware that shark fishing is illegal, and supports shark fishing and whaling. The awareness of MPA (marine protected areas) regulations was extremely low among local communities in China. The awareness of the public on the function and performance of MPAs is very low. There is no MSC certified Chinese fishery. Chinese fishermen discard or sell cetacean and sea turtle bycatch. They do not well follow fisheries policies which contribute to sustainable fisheries, such as Summer Closed Fishing policy and fishing quota arrangement.

The awareness of NGOs on cetacean bycatch reduction and sustainable fishery, the attitude of the public towards sustainable fishery, and the attitudes of fishery stakeholders towards MSC certification programme in the Netherlands are different from China.

## Conclusion

Kust en Zee wants to introduce pingers to Chinese fishermen to reduce cetacean bycatch in Chinese fishery. But marine conservation awareness, including which towards cetacean bycatch, in China is different from the Netherlands, thus the research objectives have been adjusted into showing the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between China and the Netherlands.

In the current situation of marine species protection between the Netherlands and China, the law on the prevention of alien marine species in import and export trades in China is Import and Export Animal and Plant Quarantine Law. There is no law on for the prevention of alien marine species in import and export trades in the Netherlands. Therefore, the law on the prevention of alien marine species in import and export trades in China is different than the Netherlands. No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to compare with China. No information whether the protection plans for the endangered and Red List marine species are adequate or not, in the Netherlands has been found to compare with China. No information on legal system of legislation and policies which are related to species protection in the Netherlands has been found to compare with China. No information on provincial compensation policy, which is special for species preservation, or the implementation of legislations and policies on marine species protection in China has been found to compare with the Netherlands. In the Netherlands all native marine species are protected and included in the database. In China, only endangered marine species are protected and included in the database. Therefore, the coverage of protected marine species and corresponding database is different in the Netherlands than China. No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to compare with China. No big difference in the regulations on the protection of marine species between the Netherlands and China has been found. The activities which harm protected marine species are prohibited in both the Netherlands and China. No information on what aspect has to be in ecological impact assessment in China has been found to compare with the Netherlands. No information whether the researches of marine ecosystems meet the requirements of marine conservation, or not, in the Netherlands has been found to compare with China. There are areas which are permanently closed to fishing in the Netherlands. Only in the summer closed fishing season, there are areas which are closed to fishing in China. Therefore, the level of the protection of from marine species fishery is different in the Netherlands than China. No information on the prohibited fishing gears in the Netherlands has been found to compare with China.

In the current situation of marine habitat protection between the Netherlands and China, no big difference of no-take marine nature reserves between the Netherlands and China has been found, since there are no-take marine nature reserves both in Netherlands and China. No marine nature area in National Landscapes in the Netherlands has been found. There are SMPAs (multiple-use special marine protected areas) in China. Therefore, the multiple-use special marine protected areas are different in the Netherlands than China. No information on the implementation of legislations and policies on marine habitat protection in the Netherlands has been found to compare with China. No enough figures on the MPAs in the Netherlands have been found to compare with China. In the Netherlands, Nature Conservation Act is special for the protection of habitats, including marine habitats. Marine Environment Protection

Law, the most important law on marine habitat protection in China, is mostly about the pollution of marine environment. Marine habitat protection is only a small part of it. Therefore, the focus of the law which is related to marine habitat protection is different in the Netherlands than China. No big difference in the regulations and policies on no-take marine nature reserves between the Netherlands and China has been found. There are legal systems and policies on marine nature reserves in both the Netherlands and China. No legislation or policy on National Park in China has been found to compare with the Netherlands. No marine nature area in National Landscapes in the Netherlands has been found for the comparison of relevant legislation or policy with 'Interim Rule of Special Marine Protected Areas' in China. No information on the punishment of damaging protected marine nature areas in the Netherlands has been found to compare with China. No big difference in the requirements of preservation of protected marine nature reserves between the Netherlands and China has been found. Activities which harm marine nature reserves are prohibited in both the Netherlands and China. No information on the establishment of marine protected areas in the Netherlands has been found to compare with China. No information on conservation objectives of MNRs or the management of National Parks in China has been found to compare with the Netherlands. No enough information on the problems in the management of marine nature reserve has been found in the Netherlands to compare with China. No information on the monitoring and evaluation of marine protected areas in the Netherlands has been found to compare with China. There are databases of different types of marine natures in the Netherlands. No database of MPAs in China has been found. Therefore, the database of marine nature reserves is different in the Netherlands than China. There is physical compensation in Green Space Structure Plan in the Netherlands. No physical compensation in China. Therefore, nature compensation is different in the Netherlands than China. No information on the problems of legislations, law enforcement of marine conservation, or the education of marine biodiversity and conservation in the Netherlands has been found to compare with China.

In the current situation of bycatch between the Netherlands and China, no big difference in the legislations or policies on bycatch between the Netherlands and China has been found, since there are legislations and policies on monitoring and data collecting both in the Netherlands and China. No provincial regulation on fishing discard or on turtle bycatch in the Netherlands has been found. In Dutch fisheries, cetacean bycatch species - Harbour Porpoise (*Phocoena phocoena*), Grey Seal (*Halichoerus grypus*), Short-beaked Common Dolphin (*Delphinus delphis*), and Atlantic White-sided Dolphin (*Lagenorynchus acutus*), are under the category of 'Least Concern' on the IUCN Red List. In Chinese fisheries, cetacean bycatch species - Finless porpoise (*Neophocaena phocaenoides*), is under the category of 'Vulnerable'; and Chinese white dolphin (*Sousa chinensis*), 'Near Threatened' on the IUCN Red List. Therefore, the conservation statuses of cetacean bycatch species are different in Dutch fisheries than Chinese fisheries. There is lack of figures of the quantity of invertebrates and fish bycatch in Dutch fisheries to compare with Chinese fisheries. There are extreme high ratios of discards in Dutch fisheries. There is very little discard in Chinese fisheries. Therefore, the quantities of the discards are different in Dutch fishery than Chinese fishery. No information on seabird, shark or sea turtle bycatch in the Netherlands has been found to compare with China. No big difference in the impact of bycatch on marine ecosystems between the Netherlands and China has been found, since there are big impact of bycatch on marine ecosystems both in the Netherlands and China.

In the current situation of marine conservation awareness between the Netherlands and China, There are projects on cetacean bycatch reduction, like the Dolphin Saver project from Kust en Zee, and sustainable fishery, like campaign 'Sustainable seafood on the menu' from WWF

Netherlands and the Royal Restaurant Association, Goede VIS project and the Fish Guide from the North Sea Foundation in the Netherlands. No project on cetacean bycatch reduction or sustainable fishery from NGOs in China has been found. Therefore the awareness of NGOs on cetacean bycatch reduction and sustainable fishery in the Netherlands is different from China. Seafood consumers in the Netherlands are aware of the impact of turtle and dolphin bycatch, and want to contribute to sustainable fishery by purchasing ‘Green Fish’, such as ‘dolphin safe’ tuna. This fact reflects the attitude of the public in the Netherlands towards sustainable fishery. In China, the public is not aware that shark fishing is illegal, and supports it; the public regards whaling good, and support it. These two facts reflect the attitude of the public in China towards sustainable fishery. Therefore, the attitude of the public towards sustainable fishery in the Netherlands is different from China. No information on Chinese retailers which are involved in the sale of MSC labelled fish products has been found to compare with the Netherlands. No information on the awareness of fishermen or local communities on the regulations of marine protected areas, or the awareness of the public on the function and performance of protected areas in the Netherlands has been found to compare with China. Many Dutch fisheries, exporters and processors in the Netherlands have achieved MSC certification. There is no MSC certified Chinese fishery. Therefore, the attitudes of the stakeholders of Dutch fishery towards MSC certification programme are different than which of Chinese fishery. The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on cetacean bycatch to compare with the attitudes of Chinese fishermen on cetacean bycatch. No information on the attitude of Dutch fishermen on sea turtle bycatch has been found to compare with Chinese fishermen. The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on sustainable fishery to compare with the attitudes of Chinese fishermen on sustainable fishery.

In conclusion, the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China are: the coverage of protected marine species, as well as in corresponding databases, the level of protection of marine species from fishery, the multiple-use special marine protected areas, the focus of the law, which is related to marine habitat protection, and nature compensation are different in the Netherlands than China. The conservation statuses of cetacean bycatch species and the quantities of the discards are different in Dutch fishery than Chinese fishery. The awareness of NGOs on cetacean bycatch reduction and sustainable fishery, the attitude of the public towards sustainable fishery, and the attitudes of fishery stakeholders towards MSC certification programme in the Netherlands are different from China.

It is necessary for organisations in the Netherlands or Europe to be aware of all the differences above in the current situation of marine conservation between the Netherlands and China before planning any project on marine conservation in China.

## **Recommendation**

It is not the best time to introduce pingers to Chinese fishermen at this moment, due to that there is lack of a similar background in China unlike the Netherlands to support the idea of introducing pingers to Chinese fishermen. The reasons why Dutch fishermen participate in pinger testing are: they have received much blaming for cetacean bycatch from NGOs and the public; many Dutch fisheries have achieved MSC certification (Kust en Zee, unpublished data). It is within such a background to introduce pingers to Dutch fishermen for Kust en Zee. But in China, there is no project on cetacean bycatch reduction and sustainable fisher in any NOG; the fishermen are even praised for shark fishing, despite the fact that shark fishing is illegal.

Before starting any project on marine conservation in China, it is necessary to be aware of all the differences which are presented in the conclusion.

Based on the differences in the current situation of marine species and habitat protection, bycatch and marine conservation awareness between the Netherlands and China, 6 action points - the possibilities to improve the current situation of marine conservation in China, are given (see the columns ‘Action points’ of 4 tables in Appendix II). The last 3 action points, which are for raising marine conservation awareness in China, are recommended to take: (1) Developing projects on cetacean bycatch reduction and sustainable fishery with NGOs in China from the experiences in the Netherlands. (2) Raising the awareness of the public on the impact of bycatch and overfishing on marine ecosystems in China. It might be helpful to cooperate with NGOs such as WWF China, Greenpeace China or Friends of Nature China, or mainstream media, such as CCTV (China Central Television), due to that the issues, which have been broadcasted in the programmes ‘Hot issue interviews’ (CCTV, 2010a) and ‘News investigations’ (CCTV, 2010b) on News channel of CCTV, have attracted much attention in the whole country. Environmental Protection channel (CCTV, 2010c) of CCTV is special on environmental protection or nature conservation issues. (3) MSC certifying Chinese fisheries. The other 4 action points, which concern species and habitat protection, are much more difficult to succeed than proceeding 2 action points, due to the limitation of changing legislations and policies in China for international NGOs.

It is necessary for preparing the project on marine conservation in China to consult the Dutch embassy in China on the legislations and policies which are relevant for Dutch NGOs to work in China, such as ‘international NGOs are not allowed to work independently in China without connection with local organisations’; and the possibilities of the cooperation with local organisations. Based on the advices on these two aspects from the Dutch embassy in China, a research on the feasibilities of the action points is necessary before starting the project.

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# Appendix I

**Table 1**  
Total number and area of marine nature reserves (MNR) and marine special protected areas (MSPA) in China by August 2008.

	MNR (no take)	MSPA (multiple use)	MPA (MNR+MSPA)
Total number of sites	146	12	158
Number of sites designated at the national level	32	7	39
Number of sites designated at the local level	114	5	119
Total area (million ha) <sup>1</sup>	3.56	0.21	3.77
Area of sites designated at the national level	2.29	0.13	2.42
Area of sites designated at the local level	1.27	0.08	1.35
Average size of individual sites (million ha)	0.024	0.018	0.024
Average area of sites designated at the national level	0.072	0.018	0.063
Average area of sites designated at the local level	0.011	0.016	0.011
Percentage of China's total marine area (%)	1.19	0.07	1.26

Data from Qiu, W., et al., 2009.

**Table 2**  
National marine nature reserves (MNRs) in China (by August 2008).

No. Name	Area (ha)	Main conservation targets	Year of establishment	International designation
1 Coastal Wetlands of Yalujiang Estuary	108,057	Coastal wetlands and habitats for migratory birds	1997	
2 Shedao (Snake) Island & Laotieshan	17,073	Chinese pit viper ( <i>Gloydius shedaoensis</i> ) and habitats for migratory birds	1980	
3 Dalian Seal ( <i>Phoca largha</i> )	909,000	Spotted seal ( <i>Phoca largha</i> ) and its habitats	1997	Ramsar site
4 Chengshantou	1350	Special coastal geomorphological features and seascape, relics, and fossil	2001	
5 Shuangtaizi Estuary	80,000	Red-crowned crane ( <i>Grus japonensis</i> ), Saunders's gull ( <i>Larus saundersi</i> ), and their habitats, coastal wetlands	1988	Ramsar site
6 Tianjin Paleo-Coast & Wetlands	99,000	Shellfish bank, oyster beds, paleo-coast relics, and coastal wetlands	1992	
7 Changli Golden Beach	30,000	Coastal sandy beach, lagoon, wetlands, and nearshore ecosystem	1990	
8 Binzhou Shellfish Bank & Wetlands	80,480	Shellfish bank, paleo-coast relics, coastal wetlands, and migratory birds	2006	
9 Changdao Island	5300	Migratory birds and island ecosystem	1988	
10 Yellow River Delta	153,000	Coastal wetlands and migratory birds	1992	
11 Rongcheng Wild Swan	10,500	Wild swan and other wildlife	2007	
12 Yancheng Rare Birds	453,000	Red-crowned crane ( <i>Grus japonensis</i> ), rare birds, and coastal wetlands	1992	Ramsar site, and UNESCO Man and Biosphere reserve
13 Dafeng <i>Elaphurus davidianus</i>	2667	Pere David's deer ( <i>Elaphurus davidianus</i> ) and coastal wetlands	1997	Ramsar site
14 Chongming Island Eastern Coast	24,155	Migratory birds and coastal wetlands	2005	Ramsar site
15 Shanghai Jiuduansha Island	42,020	Migratory birds and coastal wetlands	2005	
16 Nanji Island Archipelago	19,600	Islands and other marine ecosystems, shellfish, and seaweeds	1990	UNESCO Man and Biosphere reserve
17 Paleo-Forest Relics of Shenhuan Bay	3100	Relics of paleo-forest and oyster beds, coastal geomorphological feature, and seascape	1992	
18 Xiamen Rare Marine Species	33,088	Chinese white dolphin ( <i>Sousa chinensis</i> ), fin fish ( <i>Branchiostoma belcheri</i> ), 2000 and little egret ( <i>Egretta garzetta</i> )	2000	
19 Zhangjiang Estuary Mangrove	2360	Mangrove and coastal wetlands	2003	
20 Huidonggang Sea Turtle	800	Sea turtle and their nesting sites	1992	Ramsar site
21 Neilingdingdao Island & Futian	815	Mangrove, birds, and rhesus monkey	1988	
22 Pearl River Estuary Chinese White Dolphin	46,000	Chinese white dolphin ( <i>Sousa chinensis</i> ) and its habitats	1991	
23 Zhanjiang Mangrove	20,279	Mangrove ecosystem	2003	Ramsar site
24 Xuwen Coral Reefs	1333	Coral reefs	2007	
25 Shankou Mangrove	8000	Mangrove ecosystem	1990	Ramsar site, and UNESCO Man and Biosphere reserve
26 Hepu Dugong	35,000	Dugong and marine ecosystem	1992	
27 Beilunhe Estuary	30,000	Mangrove ecosystem	2000	Ramsar site
28 Dongzhaihang Mangrove	3337	Mangrove ecosystem	1986	Ramsar site
29 Dazhoudao Islands Marine Ecosystem	7000	German's swiftlet ( <i>Collocalia germanii</i> ) and its habitats, island ecosystem	1990	
30 Sanya Coral Reefs	5568	Coral reefs	1990	UNESCO Man and Biosphere reserve
31 Tongguling	4400	Coral reefs, tropical seasonal forests and associated wildlife	2003	
32 Leizhou Rare Marine Life	46,865	Rare marine species	2008	

Data from Qiu, W., et al., 2009.

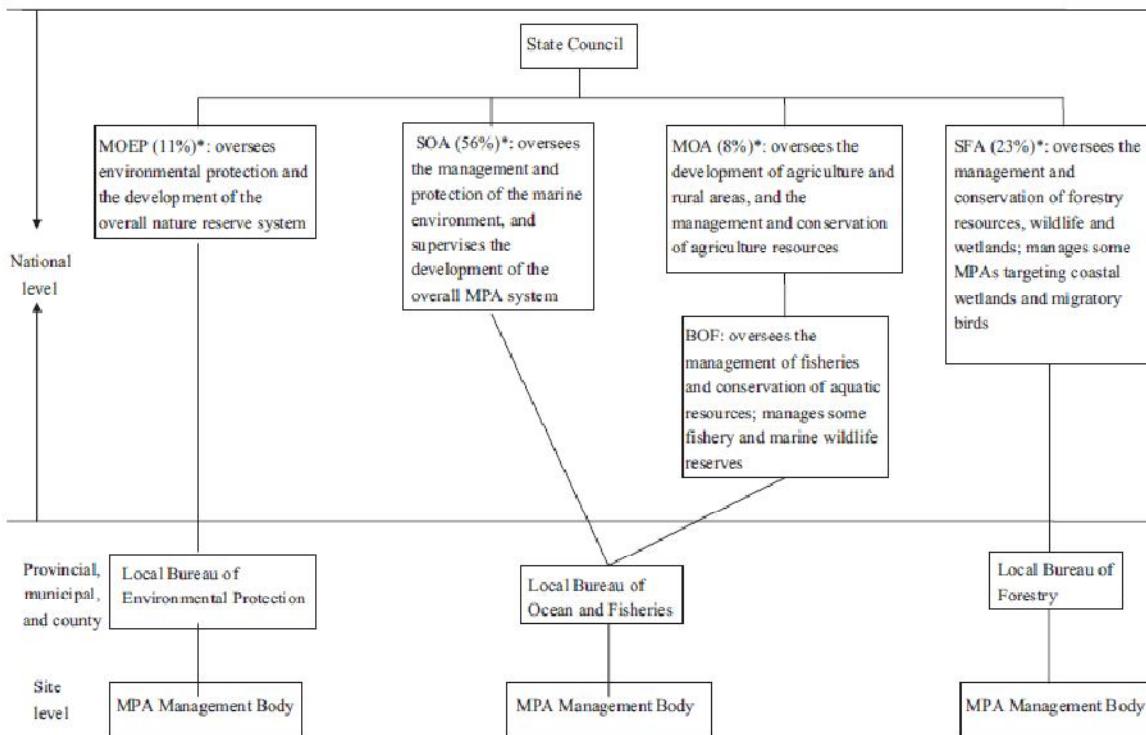


Fig. 2. Administrative structure of MPAs in China. MOEP, Ministry of Environmental Protection; SOA, State Oceanic Administration; MOA, Ministry of Agriculture; SFA, State Forestry Administration; BOF, Bureau of Fisheries. \*The percentage (in terms of number) of the MPAs managed by each agency.

Data from Qiu, W., *et al.*, 2009.

Table 1. Nature reserve development planning in China.

Types of habitat	Area of nature reserves by year 2000 (million hm <sup>2</sup> )	Percent area of this type habitat in China (%)	Area of nature reserves by year 2010 (million hm <sup>2</sup> )	Percent area of this type habitat in China (%)
Forest	22.37–23.45	22.4–23.5	26	26.0
Grassland	11.40–12.00	6.6–6.9	16	9.2
Desert	39.30–39.95	20.5–20.8	45	23.4
Terrestrial wetland and fresh waters	8.77–9.07	23.1–23.9	11	28.9
Ocean and coast	4.50–4.80	1.0	12	2.5

Data from Xu, H., *et al.*, 1999.

## **Appendix II Tables of comparing the current situation of marine conservation between the Netherlands and China**

## Appendix II Comparison tables of the current situation of marine conservation between the Netherlands and China

Table 1 Comparing the current situation of marine species protection between the Netherlands and China

Aspect	In the Netherlands	In China	Differences	Action points
Legislations and policies on marine species protection	<p>The laws, which are related to marine species protection in the Netherlands, are: Flora and Fauna Act (Flora- en faunawet) (Overhead.nl, 2010b) and Fisheries Act (Visserijwet) (Overhead.nl, 2010a). There is no law on for the prevention of alien marine species in import and export trades in the Netherlands. No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) (Wetboek online, 2010) in the Netherlands has been found.</p> <p>Other regulations and policies which are related to marine species protection in the Netherlands are: Red Lists (LNV, 2004) - a list of marine species which have disappeared from a specific area, and marine species which have sharply decreased or are rare in an area (LNV, 2010a), which is drawn up by the Minister of LNV; incentive measures for active protection the marine species, whose survival is threatened, are dealt with in the Multi-year Programme for Implementation of Species Policy (Meerjarenprogramma Uitvoering Soortenbeleid) 2000-2004, which is aimed at drafting and implementing of</p>	<p>The laws, which are related to marine species protection in China, are: Article 9 of the Constitution (NPC, 2004), Wildlife Protection Law (Standing Committee, 2009), Fisheries Law (Standing Committee, 1986), Import and Export Animal and Plant Quarantine Law, which is for the prevention of alien marine species in import and export trades (Standing Committee, 1991), and the articles on the punishment of illegal catching, killing, transporting, and selling of rare and endangered marine species in Criminal Law (Standing Committee, 1997).</p> <p>Other regulations and policies which are related to marine species protection in China are: National Wildlife Protection List (SFA, 1989), where the Chinese White Dolphin (<i>Sousa chinensis chinensis</i>) (Near Threatened) (IUCN Red List, 2008a) are under first class protection; other cetaceans, Loggerhead (<i>Caretta caretta</i>) (Endangered) (IUCN Red List, 1996), Green turtle (<i>Chelonia mydas</i>) (Endangered) (IUCN Red List, 2004), Hawksbill turtle (<i>Eretmochelys imbricata</i>) (Critically Endangered) (IUCN Red List, 2008b), Olive Ridley</p>	<p>The law on the prevention of alien marine species in import and export trades in China is Import and Export Animal and Plant Quarantine Law. There is no law on for the prevention of alien marine species in import and export trades in the Netherlands. Therefore, the law on the prevention of alien marine species in import and export trades in China is different than the Netherlands. No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to</p>	

<p>national species protection plans for endangered species (LNV, 2010a). There are specific marine species protection plans for endangered and Red List marine species (LNV, 2007). The national species protection plans indicate what extra measures are needed to protect endangered marine species in the Netherlands (MNP, 2004b). No information whether the protection plans for the endangered and Red List marine species are adequate or not, in the Netherlands has been found.</p> <p>No information on legal system of legislation and policies which are related to species protection in the Netherlands has been found.</p> <p>A provincial compensation scheme can contain regulations which are aimed specifically to preservation of marine species. In this case, the provincial marine species policy goes beyond the national policy (edu2.web.wur.nl, 2010).</p>	<p>(<i>Lepidochelys olivacea</i>) (Vulnerable) (IUCN Red List, 2008c) are under second class protection (SFA, 1989), and Local Wildlife Protection Lists, which are in different provinces, autonomous regions or municipalities directly under the Central Government. For example, Lemur-tail Seahorse (<i>Hippocampus mohnikei</i>) (Data Deficient) (IUCN Red List, 2006) is on Wildlife Protection List of Liaoning Province (Liaoning provincial government, 1991), Regulations for the Implementation of Wild Aquatic Animal Protection (State Council, 1993), Regulations on Wild Medicinal Material Resource Conservation and Management (State Council, 1987) (Xu, H. et al., 1999), Provisions on the Conservation of Biological Resources in Bohai Sea (MOA, 2004), Implementing Regulations on Fishery Law (State Council, 1987) (Xu, H. et al., 1999), Fishing Regulations in Guangdong Province (Oceanic and Fishery Administration of Guangdong Province, 2007).</p> <p>The legal systems to implement these legislations and policies are: the System of Environmental Impact Assessment (EIA), which defined by the 1986 Administrative Rule for Environmental Protection of Construction Projects; the licensing system include fishing license stipulated by the Fishery Law, marine special catching license and export certificate stipulated by the Wildlife Protection Law, and</p>	<p>compare with China.</p> <p>No information whether the protection plans for the endangered and Red List marine species are adequate or not, in the Netherlands has been found to compare with China.</p> <p>No information on legal system of legislation and policies which are related to species protection in the Netherlands has been found to compare with China.</p> <p>No information on provincial compensation policy which is special for species preservation in China has been found to compare with the Netherlands.</p>	
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		<p>the Implementing Regulation on Aquatic Wild Animal Conservation; the quarantine system based on the Import and Export Animal and Plant Quarantine Law to prevent the adverse impact of alien marine species on native marine biodiversity (Xu, H., <i>et al.</i>, 1999).</p> <p>No information on provincial compensation policy which is special for species preservation in China has been found.</p>		
Implementation of legislations and policies on marine species protection	The implementation of the plans is coordinated by various different organisations. At first, the Ministry of LNV coordinated the implementation, but the coordination has gradually passed into the hands of the provinces and marine species protection organisations (MNP, 2004b).	No information on the implementation of legislations and policies on marine species protection in China has been found.	No information on the implementation of legislations and policies on marine species protection in China has been found to compare with the Netherlands.	
Coverage of protected marine species and corresponding database	<p>In the Netherlands, all native marine species are under the protection of Flora and Fauna Act (edu2.web.wur.nl, 2010). All native fish are protected, with the exception of species to which the Fisheries Act applies (MNP, 2004a).</p> <p>The distribution data of all protected marine species in the Netherlands is in National Database Flora and Fauna (GaN, 2010).</p>	<p>In China, the rare or of endangered marine species are under the protection of the Constitution (NPC, 2004) and Wildlife Protection Law (Standing Committee, 2009), and their information are in the Endangered and Protected Species Database of Chinese Animals (CAS, 2010).</p>	<p>In the Netherlands all native marine species are protected and included in the database. In China, only the rare and endangered marine species are protected and included in the database. Therefore, the coverage of protected marine species and corresponding database is different in the Netherlands than China.</p>	<p>Including other marine species than endangered marine species under the marine species protection system, such as marine species protection list and marine species database, in China, from the experiences in the</p>

			Netherlands.
Strict level of the marine species protection	<p>No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) (Wetboek online, 2010) in the Netherlands has been found.</p> <p>The activities which are prohibited by the law to protect marine species reflect the strict level of marine species protection. All activities which are dangerous to marine wildlife are prohibited according to the prohibitive conditions in Flora and Fauna Act (edu2.web.wur.nl, 2010). Additional provisions apply with respect to seabirds and to the marine species listed in Annex IV to the Habitats Directive (MNP, 2004a).</p> <p>It is possible to deviate from the provisions of certain prohibitions if doing so does not affect the preservation of the marine species unfavourably. If the population size and the range of distribution do not decrease significantly and when the marine species can survive in a natural manner, a spatial operation can be permitted. But first an exemption has to be granted. For Strictly protected marine species, because of the very strict demands of the European Birds Directive, it is not possible to obtain exemption for negative impact on protected seabirds. The impacts on strictly protected marine species have to be assessed explicitly on the risk of jeopardizing the 'favourable conservation status'. When this hap-</p>	<p>Illegal catching, killing, transporting, and selling of rare and endangered marine species can incur sentences up to more than ten years, and imposition of heavy fines (Criminal Law) (Standing Committee, 1997).</p> <p>It is prohibited to catch or kill marine wildlife under special state protection (Article 16 of Wildlife Protection Law) (Standing Committee, 2009). It is prohibited to catch and kill marine species under first class protection (Regulations on Wild Medicinal Material Resource Conservation and Management) (Xu, H. et al., 1999). It is prohibited to sell and purchase protected marine species (Wildlife Protection Law) (Standing Committee, 2009). Fishing rare and endangered marine species is prohibited (Fisheries Law) (Standing Committee, 1986). Where catching or fishing marine wildlife which is under first class state protection is necessary for scientific research, domestication and breeding, exhibition or other special purposes, the concerned unit must apply for a special catching license to wildlife administration department of the State Council; where catching or fishing of marine wildlife under second class state protection is intended, the concerned unit must apply for a special catching license to wildlife administration department of a provincial government, an autonomous region or a municipality which is directly un-</p>	<p>No article on the punishment of illegal catching, killing, transporting, and selling of protected marine species in Criminal Law (Strafrecht) in the Netherlands has been found to compare with China.</p> <p>No big difference in the regulations on the protection of marine species between the Netherlands and China has been found. The activities which harm protected marine species are prohibited in both the Netherlands and China.</p>

<p>pens, no exemption is possible. When the impact on strictly protected marine species is not very serious, an exemption is possible under special conditions. Protected marine species are subject to a less strict standard of review. Prohibitive conditions, concerning disturbance, will no longer apply to common marine species. It will be no longer necessary to make an extensive assessment with regard to these groups of marine species. Prohibitive conditions on killing these marine species and a duty of care still apply. When negative impact is expected on other than strictly protected marine species, and where the 'favourable conservation status' is not in danger, an exemption can be requested (edu2.web.wur.nl, 2010).</p> <p>'Flora and Fauna Act' includes a duty of care, applying to all marine species. To every project, location, action or activity, prohibitive conditions and the 'duty of care' applies: 'everyone is required to treat all wildlife and their habitats with due care'. In other words, 'everyone who knows or within reason can suspect that his actions or neglect may affect marine flora or fauna, is obliged to omit such actions as far as this reasonably can be demanded of him, or to take measures that can be demanded of him, to prevent or otherwise limit the effects or to make them undone.' Everyone who for example, from the developer behind his desk, planning a new project, until the working people at the building</p>	<p>der the Central Government (Article 16 of Wildlife Protection Law). Anyone who is engaged in catching marine wildlife must observe the prescriptions of the special catching license or the catching license with respect to the species, quantity, area and time limit (Article 19 of Wildlife Protection Law). It is allowed to catch and kill the marine species under second and third classes protection with a license (Regulations on Wild Medicinal Material Resource Conservation and Management) (Xu, H. et al., 1999).</p>		
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	site, should act or omit actions in a way, that the affect on marine species will be prevented or minimized (LNV, 2010a).			
Ecological impact assessment for marine species	Ecological impact assessment is obliged for every project which may have impact on protected marine species to describe the impact. Three aspects are important to the assessment: the size of the population, the range of distribution, and the naturalness of the situation. When making impact predictions, these aspects have to be specified and quantified as much as possible (Flora and Fauna Act) (edu2.web.wur.nl, 2010).	Ecological impact assessments for capital construction projects, technical renovation projects as well as regional development construction projects that may generate impact on the marine biodiversity should follow the Environmental Impact Assessment (EIA) system (Wildlife Protection Law) (Standing Committee, 2009; Xu, H., <i>et al.</i> , 1999). No information on what aspect has to be in ecological impact assessment in China has been found.	No information on what aspect has to be in ecological impact assessment in China has been found to compare with the Netherlands.	
Monitoring and research of marine species	Monitoring and research of marine ecosystems are carried out in IMARES in the Netherlands (IMARES, 2010). No information whether the researches of marine ecosystems meet the requirements of marine conservation, or not, in the Netherlands has been found.	The monitoring centre for marine species is in the Ministry of Forestry (MOF). The Chinese Ecosystem Research Network (CERN) contains marine ecological field stations, which are set up by the Chinese Academy of Sciences (CAS), where the researches on structures, functions and succession of marine ecosystems and marine species dynamics are conducted. The research on marine biodiversity is far from meeting the requirements of marine conservation in China. The distribution, functions, benefits, losses, and threats of marine biodiversity have not been clearly identified, and this hinders marine conservation in China (Xu, H., <i>et al.</i> , 1999).	No information whether the researches of marine ecosystems meet the requirements of marine conservation, or not, in the Netherlands has been found to compare with China.	
Protection level of marine species	In the Netherlands, the area which is permanently closed to fishing Seabed (mussel fishery, cockle fishing with bottom fishing gear with tickler chains) is equivalent to 26% of the Inter-	The summer closed fishing season in South China Sea is from 12 o'clock on the first of June till 12 o'clock on the first of August. At present the controlled fishing vessels under the	There are areas which are permanently closed to fishing in the Netherlands. Only in the sum-	Including sea areas which are permanently closed to fishing

from fishery	<p>tidal in the Wadden Sea. In the Seabed closed fishing areas, the shrimp fishery is not allowed on the flats (the Intertidal). The other trawl fisheries, whether or not fitted with tickler chains, on the flats (the Intertidal) throughout the PKB-field not allowed (VROM, LNV, RCW, 2010).</p> <p>No information on the prohibited fishing gears in the Netherlands has been found.</p>	<p>system are trawler and canvas stow net in East China Sea. Lin Wendan and Lin Shoude (2006) consider that the summer closed fishing season should be from 12 o'clock on the fifteenth of May till 12 o'clock on the fifteenth of July. The season should be longer, because (1) the spawning season is in the spring. The developing season of fingerling is between April and May. The growing season of fingerling is between June and September. (2) The most active fishery production period is in May and fishing effort is highest. And the season should be advanced 2 weeks. The gill net and angling fisheries should be restricted during summer closed fishing season. More fishing gears should be restricted in Chinese marine fishery (Gao, J., 2006).</p> <p>The fishing gears which may harm fish resources are illegal (Regulations of Fish Resources Protection in Bohai Sea) (MOA, 1991).</p>	<p>mer closed fishing season, there are areas which are closed to fishing in China. Therefore, the level of the protection of from marine species fishery is different in the Netherlands than China.</p> <p>No information on the prohibited fishing gears in the Netherlands has been found to compare with China.</p>	<p>in fishery policies in China, from the experiences of fishery policies in the Netherlands.</p>
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Table 2 Comparing the current situation of habitat protection between the Netherlands and China

Aspect	In the Netherlands	In China	Differences	Action points
No-take marine nature reserves (MNRs)	The no-take marine nature reserves in the Netherlands are: marine sites of Natura 2000 sites (LNV, 2007), and marine nature areas refer to 'Nature Monuments' (LNV, 2010b), 'Special Protection Areas (SPAs)' (LNV, 2010a) and 'National Ecological Network' (Ecologische Hoofdstructuur, EHS) (LNV, 2007).	The no-take marine nature reserves in China are the MNRs (MOA, 1995).	No big difference in no-take marine nature reserves between the Netherlands and China has been found. There are no-take marine nature reserves both in Netherlands and China.	
Multiple-use special marine protected areas (SMPAs)	The multiple-use special marine protected areas in the Netherlands are: marine nature areas refer to 'National Parks' (NPs) (LNV, 2010a). No marine nature area in National Landscapes (LNV, 2010d) has been found.	The multiple-used special marine protected areas are: marine nature areas refer to 'National Park of China' (National Park of China, 2010); and SMPAs - any area with special geographic conditions, ecosystem, living or non-living resources, and where marine development and exploitation are with special needs; and a special management may be ensured by adopting effective conservation measures and scientific development models (Article 23 of Marine Environment Protection Law) (Standing Committee, 1999).	No marine nature area in National Landscapes in the Netherlands has been found. There are SMPAs (multiple-use special marine protected areas) in China.	

PAs)			Therefore, the multiple-use special marine protected areas are different in the Netherlands than China.	
Implementation of legislations and policies on marine habitat protection	No information on the implementation of legislations and policies on marine habitat protection in the Netherlands has been found.	Many action plans or projects on marine conservation in China's Agenda 21 have not been implemented due to insufficient funding. Insufficient funding, long-term preparation and initiation of GEF projects have impaired the effective implementation of some priority projects (Xu, H., <i>et al.</i> , 1999).	No information on the implementation of legislations and policies on marine habitat protection in the Netherlands has been found to compare with China.	
Figures on ma-	There are 16 marine sites of Natura 2000 sites (LNV, 2006b) in the Netherlands.	There are 158 MPAs (see Table 1 in Appendix I), include 32 NMNRs (see Table 2 in Appendix I) and 114 Local-level MNRs in China now (Qiu, W. <i>et al.</i> , 2009). No-take MNRs currently account for 94.4% of the total area of China's MPA system, which differs strongly from the global situation, where	No enough figures on the MPAs in the Netherlands	

rine pro- tecte d areas (MP As)		no-take zones constitute only a tiny fraction of the global MPA system (Wood, L. <i>et al.</i> , 2007). There are also planning MNRs with area of 12 million hm <sup>2</sup> by 2010, which is 2.5 percent area of marine habitats (The Guideline for Nature Reserves Development Planning in China 1996–2010, see Table1 in Appendix I) (Xu, H., <i>et al.</i> , 1999).	have been found to compare with China.	
Leg- isla- tions and poli- cies on no- take MN Rs	The law which is special for no-take marine nature reserves is Nature Conservation Act (Overheid.nl, 2010c).  Other legislations and policies for no-take marine nature reserves are: Natura 2000, the management plans for 16 marine sites of Natura 2000 sites (LNV, 2010c), the EHS, Green Space Structure Plan (Structuurschema Groene Ruimte, SGR), and the permit system with permits issued by the provincial governments or the Ministry of LNV (LNV, 2010a). Marine habitat protection can also be realised through spatial planning laws. Municipal zoning plans, for example, must take account of designated marine nature reserves (edu2.web.wur.nl, 2010).	The law which is related to no-take MNRs is Marine Environment Protection Law (Stand Committee, 1999) and Island Protection Law (Standing Committee, 2010).  The regulations and policies on no-take MNRs are: Regulations on Nature Reserves (State Council, 1994), the 1996 Rule of Marine Nature Reserves (Qiu, W. <i>et al.</i> , 2009), and Measures on the Management of Marine Nature Reserves (SOA, 1995) (Zou, K. 2003), China's Ocean Agenda 21 (SOA, 1996), Chinese Oceanic Biodiversity Conservation Action Plan, the management plans of the MNRs (Xu, H. <i>et al.</i> , 1999), the Programme on Developing China's Marine Nature Reserves, including the plans to establish a network of MNRs (Bureau of Comprehensive Marine Management, 1996), the Guideline for Oceanic Nature Reserve Development Planning in China (1996–2010), the National Ecological Environment Protection Programme (2000), the Programme of the Management of National Marine Environmental Protection (Xu, H. <i>et al.</i> , 1999), the Principles on Categorising Marine Nature Reserves and Dividing Their Levels (State Bureau of Quality Technology Supervision, 1998) (Zou, K. 2003), the special fund of the policy for ecological environment compensation fee (Xu, H. <i>et al.</i> , 1999), the Scheme on Construction of Sanya Coral Reef Nature Reserve (SOA, 1995), Chapter 15 of China's Agenda 21 (SPC, 1996), the Chinese Environmental Protection Action Plan (1991–2000) (MEP and SPC, 1994), the Outline for Ninth Five-Year Plan and Perspective Objectives by 2010 for Economic and Social Development of the People's Republic of China (NPC, 1996) (Xu, H. <i>et al.</i> , 1999), and Chapter Six of the Chinese Country Study on Biological Diversity (MEP, 1998a).	In the Netherlands, Nature Conservation Act is special for the protection of habitats, including marine habitats. Marine Environment Protection Law, the most important law on marine habitat protection in China, is mostly about the pollution of marine environment. Marine habitat protection is only a small part of it. Therefore,	Updat- ing leg- isla- tions on ma- rine conser- vation by in- cluding a law which is spe- cial for marine habit- at pro- tec- tion with the fo- cus on marine conser- vation in Chi-

		<p>the focus of the law which is related to marine habitat protection is different in the Netherlands than China.</p> <p>No big difference in the regulations and policies on no-take marine nature reserves between the Netherlands and China has been found. There are legal systems and policies on marine nature reserves in both the Netherlands and China.</p>	na.
Legislations	The policies which are for multiple-use special marine protected areas are: annual subsidies for NPs with marine na-	No legislation or policy on National Park in China has been found. The regulation on multiple-used SMPAs is Interim Rule of Special Marine Protected Areas (SOA, 2005).	No legislation or policy on National Park

and policies on multiple-use SMP As	<p>ture areas to implement their year plans as based on the ten-year management and development plans, which are granted by the Minister of LNV. The Ministry may also give one-off support to activities that enhance the quality of the marine nature areas of the NPs (SNP, 2010b). No marine nature area in National Landscapes in the Netherlands has been found.</p>		<p>in China has been found to compare with the Netherlands. No marine nature area in National Landscapes in the Netherlands has been found for the comparison of relevant legislation or policy with 'Interim Rule of Special Marine Protected Areas' in China.</p>	
Strict level of the marine habitat protection	<p>No information on the punishment of damaging protected marine nature areas in the Netherlands has been found.</p> <p>Nature Conservation Act lays down a duty of care for everyone in or dealing with marine nature areas. Actions which might cause damage should not be undertaken (LNV, 2007). A permit must be obtained for activities that may have a detrimental effect on marine natural val-</p>	<p>Illegal killing, fishing, aquaculture and other damaging to the habitats in MNRs can be imposed a fine of up to RMB 10,000 (Articles 34, 35 and 38 of Regulations on Nature Reserves) (State Council, 1994).</p> <p>Illegal fishing or collecting marine living species, and other activities which harm marine species and their habitats are prohibited in MNRs (Article 15 of the 1995 Measures on the Management of Marine Nature Reserves) (MOA, 1995). The management of MPAs follows a zoning scheme (Qiu, W., <i>et al.</i>, 2009). A MNR may be divided into core, buffer, and experimental zones in accordance with the natural environment, natural resource conditions, and requisite level of protection. No activities can be conducted in the core zone</p>	<p>No information on the punishment of damaging protected marine nature areas in the Netherlands has been found to compare with</p>	

	ues (edu2.web.wur.nl, 2010).	except for scientific investigations and research approved by the department of ocean management at the provincial level; in the buffer zone, appropriate fishing production, tourism, scientific research, and educational excursion may be conducted in a limited time and scope and subject to the approval of the management organ of the protected area, on the condition that the protected objects are not damaged or polluted; appropriate development activities with a plan may be conducted in the experimental zone under the guidance of the management organ. A MNR may also be protected for an absolute or relative period. Absolute protection period refers to a certain period when adverse activities against the protected objects are prohibited; and appropriate scientific research or teaching excursion may be conducted subject to the approval. Relative protection period refers to the time except the absolute protection period when other activities can be conducted except for catching or harming the protected objects (Article 13 of the 1995 Measures on the Management of Marine Nature Reserves) (MOA, 1995). Killing and catching marine wildlife and other activities which are harmful to living and breeding of marine wildlife are prohibited in MNRs and areas, and during seasons which are closed to killing and catching (Article 20 of Wildlife Protection Law) (Standing Committee, 2009).	China.  No big difference in the requirements of preservation of protected marine nature reserves between the Netherlands and China has been found. Activities which harm marine nature reserves are prohibited in both the Netherlands and China.	
Establishment of the MPAs	No information on the establishment of marine protected areas in the Netherlands has been found.	For national MPAs, candidate sites and their boundaries are proposed by provincial governments, evaluated by a special protected-area committee consisting of scientists and representatives from relevant national government agencies, and submitted to the State Council for MNRs or State Oceanic Administration (SOA) for MSPAs for final approval and declaration. Locally designated MPAs are nominated, evaluated, and declared by local governments (Qiu, W., <i>et al.</i> , 2009). There has been no systematic planning of MPAs at a national scale in China; therefore the selection of MPAs is often the responsibility of lower level governments (Liu, Y. and Qiu, J., 2005). Locally designated MPAs now contribute to over 75% of the number and 35% of the total	No information on the establishment of marine protected areas in the Netherlands has been found to compare with China.	

		<p>area of the MPA system (See Table 1 in Appendix) (Xu, J. and Melick, D. R., 2007). An emphasis on <i>de jure</i> fully protected MPAs and the lack of objective evaluations have enabled rapid and continuous increases in the number and area of fully protected MPAs on paper (Qiu, W. <i>et al.</i> 2009). Decentralised planning leading to the selection of unsuitable areas and the exclusion of ecologically important areas from the MPA system (Liu, Y. and Qiu, J., 2005; Liu, J., <i>et al.</i>, 2003). Local governments in China often perceive the development of protected areas as a symbol of administrative achievement and a potential source of tourism income. As a result, important decisions such as the zoning and configuration of protected areas are regularly driven by local socio-economic interests rather than by strategic objectives; and rigorous scientific assessments are triggered only when a local government wants to upgrade a locally designated MPA to a national rank (Jim, C-Y. and Xu S-S-W. 2004).</p> <p>The establishment of the MNRs is still very limited and there are many other marine areas that need protection under the legal framework. The ratio between marine and land nature reserves is too small in terms of quantity and size (700 in number and 65 million ha.). The sea area is one-third of the land area, but the quantity of marine nature reserves are only one-twelfth of the total number of nature reserves in the country (Bureau of Comprehensive Marine Management, 1996).</p> <p>Compared to MNRs, the establishment of SMPAs has been a recent development, with the first SMPA declared in 2002 (UNEP-WCMC, 2008).</p>	
Management of the MPAs	A management plan must be adopted within three years after a marine nature area is designated as Natura 2000 site. It is set up to six years, followed by a new plan. The concerned coastal provinces are generally responsible for preparing management plans for 16 marine sites.	Currently, the MPA system in China is governed under a three-tier structure operating at national, local (provincial/municipal/county), and site levels. The State Council is the top policy- and decision-making body. The Ministry of Environmental Protection (MEP) oversees the development and management of the overall protected-area system in China, while the SOA is officially charged with the overall planning and supervision of the MPA system (See Figure 2 in Appendix I) (Qiu, W., <i>et al.</i> , 2009). Under the current governance	No information on conservation objectives of MNRs in China has been found to

<p>The management plans are in close consultation with owners, users and other concerned authorities, particularly municipalities, provinces and water boards. The concerned governments propose the management plans, and the State manages or takes responsibility for 16 marine sites (LNV, 2010c). A dual approach was taken in formulating the Natura 2000 targets (conservation objectives) for marine nature areas of Natura 2000 sites at national level and at site level. One process line focuses on marine habitat types and marine species and leads to the targets at national level and also to a picture of the relative importance and conservation status of the marine habitat types and marine species for which the Netherlands has responsibility, with more detailed interpretation and assessment of the objectives and targets. The second process line leads to marine conservation objectives at site level. The analyses carried out in connection with this second process line provided important input for the purpose of assigning conservation objectives to specific marine sites. Standard formulations of the process of formulating the Natura 2000 targets for 16 marine sites are: discussions, consultation rounds, developing public support, sharing of information and expert meetings</p>	<p>structure, the central government is mainly responsible for the development of policies, regulatory frameworks, plans, and technical guidelines relevant to the overall MPA network. It also provides limited funds to cover the cost of infrastructures in newly established national MPAs (Cui, F. and Liu, B-Y., 2006). The bulk of protected-area funding in China now comes from local governments (Xu, J. and Melick, D. R., 2007). Local governments are mainly responsible for providing personnel and funds for the daily management and enforcement of individual MPAs and ensuring that the various national provisions related to MPAs are implemented within their jurisdictions (Cui, F. and Liu, B-Y., 2006). This results in a focus of responsibilities on local governments with little actual control of exploitation from the central government (Qiu, W., <i>et al.</i>, 2009).</p> <p>There should be corresponding management organs equipped with professional and technical personnel for MNRs. They have the following responsibilities: (a) to implement laws, regulations, and policies relating to marine nature reserves; (b) to adopt detailed management methods and regulations for the protected areas and to manage all the activities within the areas; (c) to prepare overall plans to build up protected areas; (d) to place boundary markers and other protective facilities for the protected areas; (e) to organize basic investigations and regular monitoring in the protected areas and to establish the records for the protection work; (f) to organize ecological and environmental restoration and scientific research in the protected areas; and (g) to launch marine education programs (Article 12 of the 1995 Measures on the Management of Marine Nature Reserves) (MOA, 1995). The management of MNRs is part of the management of the country's overall nature reserves; also part of the protection of marine environment and the preservation of marine natural resources (Zou, K., 2003). No information on conservation objectives of MNRs in China has been found.</p> <p>No information on the management of National Parks in China has been found.</p>	<p>compare with the Netherlands. No information on the management of National Parks in China has been found to compare with the Netherlands.</p> <p>No enough information on the problems in the management of marine nature reserve has been found in the Netherlands to compare with China.</p>
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<p>(LNV, 2006a).</p> <p>In deciding on strategy and policy, the NP work closely together in the platform Samenwerkingsverband Nationale Parken (SNP) (SNP, 2010b). Landowners, site managers and other stakeholders are jointly responsible for the conservation and development of the quality of these nature areas (SNP, 2010a). Each park with marine nature areas has at least one visitor information centre, which aims to inform, teach and amuse both young and old. In many NPs with marine nature areas, studies are conducted into park management and design for the marine nature areas (LNV, 2007).</p> <p>There are different organisations for the management of different Natura 2000 sites. For example, there are 7 different organisations listed as management bodies for Natura 2000 site Number 1 Wadden Sea (LNV, 2010e). It might raise conflicts and confusion of authority and lead to low efficiency in the management of Natura 2000 sites.</p>	<p>A large proportion of MPAs, particularly locally designated MPAs, do not have management bodies and can easily become ‘paper parks’ due to lack of enforcement. For example, in the coastal province of Fujian, 43% of MPAs do not have a management body and staff to carry out routine enforcement tasks (Chen, C-M., 2006). The lack of funding and human resources is a major obstacle for adequate enforcement of MPAs (Liu, Y. and Qiu, J. 2005). It was reported that protected-area funding in China was US\$52.7 per square kilometer in 1999, much lower than the average of US\$157 per square kilometer in developing countries estimated by the World Conservation Monitoring Centre in 1995 (CNCMB, 2000). Overall, the investment on China’s MPA system has been extremely limited considering the relatively strict regulations and the huge difficulties for enforcement (Qiu, W. <i>et al.</i>, 2009).</p> <p>Many MPAs in China suffer from low management effectiveness, resulting from limited stakeholder involvement, insufficient investment, and major conflicts between conservation objectives and socio-economic and political interests (Qiu, W., <i>et al.</i>, 2009). Insufficient public consultation in MPA decision-making potentially escalates people–park conflicts (Qiu, W. <i>et al.</i>, 2009). Activities such as pollution within and adjacent to the MPAs have resulted in large-scale, often irreversible, changes to marine ecosystems (SOA, 2008).</p> <p>There is increasing participation and influence of local governments and private sectors, but very limited involvement of local communities in the management of MPAs in China (Qiu, W., <i>et al.</i>, 2009). Local governments and the private sector have played an essential role in the management of MPAs in China. In two out of three case studies in a programme policy analysis, the main source of MPA funding comes from the private sector and the county government, respectively. In all three cases, local governments facilitate coordination between the MPA management body and local government agencies, such as fishery, and tourism departments and local law enforcement units. With insufficient investment from higher level governments, the sup-</p>	
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	<p>port from the private sector and local governments are described by all three MPA managers as “indispensable” to their work. However, the participation of the private sector and local governments has also brought dangers to conservation. Their participation has been strongly influenced by economic interests. Compared to the active participation of local governments and the private sector, local communities are less involved in MPA management. In all three MPAs, annual and biannual meetings were organized by the MPA management bodies, however such meetings were considered as only “<i>formalities</i>” by both community members and MPA managers, rather than real opportunities for communities to participate in MPA decision-making. Despite their lack of participation, over 40% of local community members indicated that they benefit from MPA management, and a further 23% indicated that MPAs do not have any impacts on their livelihoods. This is because (1) some community members are offered jobs as a result of tourism development; and (2) current MPA management in China mainly focuses on the control of commercial activities that may cause large-scale and irreversible ecological damages, traditional and small scale uses of resources practiced by local communities have not been subject to control (Chen, C-M., 2006).</p> <p>There are challenges raised by a growing population and related pressures for rapid economic development, coupled with a lack of historical experience with public participation in governance decisions for the management of the MPA system (Qiu, W., <i>et al.</i>, 2009). The resident population size within a MPA in China typically ranges from a few thousand to over 10,000 (Qiu and McManus, unpublished data); in some MPAs it approaches 100,000, and local communities often rely heavily on coastal and marine resources for their livelihoods (Cui, F. and Liu, B-Y. 2006). In a country with a growing population and related pressures for rapid economic development, coupled with a lack of historical experience with public participation in governance decisions, decentralisation needs to be pursued carefully to enhance strategic conservation and empowerment of communities (Qiu, W. and Jones, P., 2009).</p>	
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	<p>Most MNRs are short of funds, high-level personnel, advanced management, and a sound organisation system (Goodwin, H., 1996). In November 2000, the SOA East China Sea Bureau carried out an inspection of the management of MNRs in the East China Sea area including three reserves: Jinshan Reserves in Shanghai; Xiamen Precious Species Protection Reserves in Fujian; and Longhai Mangrove Reserves in Fujian. The problems discovered during the inspection included: (a) the absence of a sound management mechanism; (b) a lack of professional knowledge on the part of the management personnel (SOA, 2000).</p> <p>Due to overlapping management responsibilities, the marine conservation framework is quite inefficient, contributing to the damage of the marine species and their habitats. In some MNRs or marine national parks, there are different management organs established by different government departments, thus making management chaotic (Zhang, X. and Zhang X-Z, 2001; Zou, K., 2003). MNRs are classified identically as nature reserves of aquatic fauna and flora when they are established in coastal areas. Thus a problem of overlapping authority between the SOA and the Ministry of Agriculture (MOA) in the management of marine nature reserves arises (Zou, K., 2003). A major problem in the management of the MNRs is the coordination between/among different departments. As provided in the Regulations on Nature Reserves, the National Environmental Protection Agency (NEPA) is the competent authority in charge of the management of all nature reserves throughout the country. However, in terms of MNRs, the SOA is the competent authority. The question as to who has the superior authority remains open, and conflicts may arise between the two departments. This is clearly detrimental for effective management of the MNRs. Second, regulations laid down by different government departments produce overlapping authorities over the management of the MNRs. If a MNR is established due to the precious aquatic animals and plants found in the area, then who should be in charge of it: the SOA or the MOA? The situation becomes complicated if mangroves are included in the MNR: there would then be three government departments (or four, when NE-</p>	
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		<p>PA is involved) that have authority over that MNR in accordance with their respectively adopted regulations. The division of authority, if not clear-cut, would be definitely unfavorable for the sound management of the MNRs. In this respect, the role of the State Council itself would be critical. For that reason, there is a call in China to unify the management of marine nature reserves. The SOA is recommended as the competent authority to manage all marine nature reserves and coordinate interdepartmental activities (Li, G., 1994).</p> <p>Most <i>de jure</i> MNRs are implemented as <i>de facto</i> multiple-use areas, and certain levels of fishing and industrial activities are usually tolerated within them (Qiu, W., <i>et al.</i>, 2009). As a result of great user pressure and lack of enforcement capacity, the zoning schemes are often poorly recognized and implemented in protected areas in China (PATF, 2004). It has been a huge challenge to enforce MNRs in China because of the massive conflict between conservation and economic development, as well as insufficient investment on the enforcement of MNRs. The policy choice of establishing large areas of MNRs, which are in densely populated and heavily used areas in China, has partly ignored the social contexts of conservation (Qiu, W. <i>et al.</i>, 2009). Now, tourism is a common way for most MNRs to overcome financial difficulties. Tourism activities are generally planned and designed with a view to maximizing profits, which severely harms the ecosystems of MNRs. Many tourism facilities are constructed in scenic spots, which interfere with surrounding coastal and marine ecosystems (Goodwin, H., 1996). Tourism development is encouraged by the Development Programme for Marine Nature Reserves. However, such activities, while providing a source of funds for MNRs, may also threaten their viability (Zou, K., 2003).</p>	
Monitoring and evalu	No information on the monitoring and evaluation of marine protected areas in the Netherlands has been found.	<p>There are four major components in monitoring MNRs: (a) surveillance: use of vehicles and equipment to observe and investigate living conditions of protected marine species and population trends, the area's environmental status and human activities; (b) law enforcement: use of laws to prevent violations, evidence collection, and reporting to competent authorities to punish law-</p>	No information on the monitoring and evaluation of marine

ation of the MPA s		<p>breakers; (c) education about the laws relating to the MNRs; and (d) contingent protection: designed to deal with urgent incidents occurring within the MNRS and to provide protection for protected objects in the shortest possible time (Division of Personnel and Adult Education Centre, 1998a). The following should be subject to monitoring: (a) damage of mangroves; (b) damage of coral reefs; (c) damage of scenic forests and stones; (d) digging of sand without approval; and (e) illegal fishing (Division of Personnel and Adult Education Centre, 1998). There is lack of independent and objective monitoring and evaluation processes in the management of MPAs in China (Qiu, W., <i>et al.</i>, 2009). There are very few MPAs in China that have long-term monitoring programmes. However, since 2004, 18 ecological monitoring areas covering some MPAs have been established by the SOA to monitor the status of representative and fragile inshore ecosystems. These provide some indications on the status of ecosystems within some MPAs and the main threats they face. According to the 2007 monitoring data, most surveyed coral reef, mangrove, and sea-grass ecosystems in southern China remain healthy, while estuary and gulf ecosystems in heavily industrialized areas score low on the status of ecosystem health. Key threats to inshore ecosystems and MPAs include land-based pollution, mariculture, reclamation, and overexploitation (SOA, 2008). The SOA organized a self-evaluation on the management effectiveness of 27 MPAs in China. The results revealed several common problems in MPA management, including insufficient funding, particularly in locally designated MPAs, and the lack of long-term and systematic management planning, monitoring, and well-trained personnel (SOA, 2004).</p>	protected ar- eas in the Netherlands has been found to com- pare with China.	
Data ta- base of ma- rine na- ture	There are databases of different types of marine natures in the Netherlands (LNV, 2010f).	There is only information on MNRs on China Oceanic Information Network (COI, 2010), but no database of MPAs in China has been found.	There are da- tabases of dif- ferent types of marine na- tures in the Netherlands. No database of MPAs in	Devel- oping data- base of MPAs in Chi- na.

re-serves			China has been found. Therefore, the database of marine nature reserves is different in the Netherlands than China.	
Nature compensation for marine habitats	A compensation for affecting marine areas which are part of the EHS is obliged according to the SGR. In case such marine areas lose their ecological function, or when these functions are affected, compensating measures will have to be taken. For each case, the basic assumption is that no 'net loss' on marine natural values with respect to size and quality is allowed. The initiator of a spatial operation in such a marine area is responsible for the actual compensation. There are two types of compensations according to the SGR: physical and financial compensation. A new marine area of the same size and quality as the destroyed marine area is equipped in the direct surrounding area of the spatial operation as a physical compensation; if physical compensation, caused by circumstances which beyond one's control, is not or only insufficiently possible, this will be replaced by a finan-	<p>Ecological compensation is as one of the two kinds of administrative punishment for any loss or damage to nature reserves (Articles 34, 35 and 38 of Regulations on Nature Reserves) (State Council, 1994).</p> <p>A policy for ecological compensation fee was adopted in 17 regions during the last decade. This policy covered the exploitation of natural resources such as sea water, tourism (MEP, 1998a).</p> <p>A special fund of the policy was established for local nature conservation and the restoration and rehabilitation of ecological environments (Xu, H., <i>et al.</i>, 1999).</p>	There is physical compensation in Green Space Structure Plan in the Netherlands. No physical compensation in China. Therefore, nature compensation is different in the Netherlands than China.	Updating legislations and policies on nature compensation by including physical compensation in China, from the ex-pe-

	<p>cial compensation for the loss of marine nature.</p> <p>A compensation proposition has to be submitted with the exemption request for negative effects on a European protected marine nature area. The compensation plan has to meet the rules which are at some point stricter than the compensation obligation of the SGR. Therefore, a financial compensation will never be sufficient (Nature Conservation Act, 2005) (Overheid.nl, 2010c).</p> <p>Many coastal provinces have drawn up their own compensation policy in conjunction with the SGR. The conditions for compensation are usually in line with the requirements of the SGR. In this case, the provincial compensation policy goes beyond the national policy for marine nature areas (edu2.web.wur.nl, 2010).</p>		riences in the Netherlands.
Problems in marine conservation	<p>No information on the problems of legislations or law enforcement of marine conservation in the Netherlands has been found.</p> <p>No information on the problems of the education of marine biodiversity and conservation in the Netherlands has been found.</p>	<p>There is not a comprehensive law on marine conservation. The Marine Environmental Protection Law addresses quite simply on marine conservation. The conservation of coastal wetlands is not covered in either of two laws - the Fishery Law and the Wildlife Protection Law which are related to marine conservation. Most laws and regulations on marine conservation are formulated from the perspective of economic value, emphasising the utilisation of marine resources rather than marine conservation. There are more rules about administrative responsibility, but less and incomplete ones about civil and criminal responsibilities. Moreover, in dealing with civil responsibility, attention is paid to compensation for damages rather than removal of damages and</p>	<p>No information on the problems of legislations or law enforcement of marine conservation in the Netherlands has been found.</p>

	<p>rehabilitation. Articles of marine conservation are scattered in related laws and regulations on marine environmental protection and marine resource; they are stipulated in principle but lack operability. Ambiguous responsibility and unreasonable penalization of violators also undermines the effectiveness and practicability of laws and regulations. For example, similar provisions pertaining to the protection of the marine and coastal ecosystems can be found in the 1994 Regulation on Nature Reserves and the Measures on the Management of Marine Nature Reserves with Article 20, 21 and 24 of the 1999 amended Law on Marine Environmental Protection (MEPL). This overlap may create difficulties in implementation.</p> <p>Marine conservation involves a great number of administrative departments. The rights and duties of these administrative departments in charge have been clearly defined in laws and regulations, but there are no definite specifications on how to harmonise actions and relations between these departments, which often hinders them from playing an integrated role and becomes an obstacle to overall supervision and administration for marine conservation. Most administrative departments responsible for marine conservation are also in charge of marine resource management; this dual role often results in contradiction in the position of administrative departments of marine resources. The administrative interference, local protectionism, low awareness of marine conservation, insufficient public participation also influences the enforcement of laws and regulations on marine conservation.</p> <p>The education on marine biodiversity is far from meeting the requirements of marine conservation in China. Higher education cannot meet the increasing demand for marine conservation in China (Xu, H., <i>et al.</i>, 1999).</p>	<p>found to compare with China.</p> <p>No information on the problems of the education of marine biodiversity and conservation in the Netherlands has been found to compare with China.</p>	
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Table 3 Comparing the current situation of bycatch between the Netherlands and China

Aspect	In the Netherlands	In China	Differences	Action points
Legislations and policies on bycatch	<p>Under 'EU Council Regulation 812/2004, of 26 April 2004, laying down measures concerning incidental catches of cetaceans in fisheries and amending Regulation (EC) no 88/98' (EC, 2004), 10% of the fleet effort in pelagic fishery in the period of 1 December till 31 March in ICES area VI, VII and VIII (fleet segment A and C) has to be covered, and outside this area in all areas year round (fleet segment B and D) in European waters, 5% should be covered. In the Dutch situation the monitoring is integrated with the collection of discards data under the EC Data Collection Regulations 1543/2000 (EC, 2000) and 1639/2001 (EC, 2001).</p> <p>No provincial regulation on fishing discard in the Netherlands has been found.</p> <p>No provincial regulation on turtle bycatch in the Netherlands has been found.</p>	<p>The long-line onboard observer programme in Chinese fishery in the Pacific Ocean began since 2003 (Dai, X-J and Zhu, J-F, 2008).</p> <p>The IATTC Resolution C-05-01 on incidental mortality of seabirds (IATTC, 2005) calls for the Stock Assessment Working Group to provide an assessment of the impacts of bycatch on seabird populations, the first step of which is to provide a total estimate of seabird bycatch rates within IATTC fisheries (Orea, A., 2009), including Chinese fishery, since China is a member of Inter-American tropical tuna commission (IATTC) (IATTC, 2010).</p> <p>The disposal of discards in the fishing water is illegal (Fishing Regulations in Guangdong) (Oceanic and Fishery Administration of Guangdong Province, 2007).</p> <p>All turtle bycatch should be released immediately. (Rule of Guangdong Sea Turtle Resources Protection) (Guangdong Provincial Government, 1988).</p>	<p>No big difference in the legislations or policies on bycatch monitoring and data collection between the Netherlands and China has been found. There are legislations and policies on monitoring and data collecting both in the Netherlands and China.</p> <p>No provincial regulation on fishing discard in the Netherlands has been found to compare with China.</p> <p>No provincial regulation on turtle bycatch in the Netherlands has been found to compare with China.</p>	

Cetacean bycatch	<p>Stranding data and recorded post-mortem findings were studied for 153 Harbour Porpoises (<i>Phocoena phocoena</i>) (Least Concern) (IUCN Red List, 2008d) which were collected by the Seal Rehabilitation and Research Centre (SRRC; Pieterburen, the Netherlands) in the period 1984–2006. Special consideration was given to ‘bycatch’ listed as a major cause of death. A distinct increase in the numbers of stranding porpoises along the Dutch coastline has occurred in the recent years of the studied period (Osinga, N., et al., 2008). There are estimated annual harbour porpoises bycatch of 10.84 by demersal trawlers; and 3.75 by bottom-set gillnets. Thus the annual number of Harbour Porpoise bycatch for the whole Dutch fishery is around 15 (Osinga, N. et al., 2009). There were estimated bycatch of 37 Harbour Porpoises and 37 Grey Seals (<i>Halichoerus grypus</i>) (Least Concern) (IUCN Red List, 2008e) by trammel nets in cod/mixed species fishery from October till June in 2008 (Couperus, A.S., 2009).</p> <p>There were dozens of cetacean bycatch, such as Short-beaked Common Dolphins (<i>Delphinus delphis</i>) (Least Concern) (IUCN Red List, 2008f), by Dutch pelagic trawlers from July 2004 till December 2005. Comparison with earlier bycatch numbers of the period 1993–1996, indicates a large inter-annual variability: in some years the bycatch numbers can be as high as several hundred (Couperus, A.S., 2006). There were cetacean bycatch of less than 10, such as the Atlantic White-sided Dolphin (<i>Lagenorynchus acutus</i>) (Least Concern) (IUCN Red List, 2008g), by Dutch pelagic trawlers in 2006, (Couperus, A.S., 2007).</p>	<p>Finless porpoises (<i>Neophocaena phocaenoides</i>) (Vulnerable) (IUCN Red List, 2008h) are probably killed in considerable numbers; recorded incidental catches suggested that dozens, perhaps hundreds, have been caught annually in gillnets, drift-nets, trammel nets, stow nets and pound nets along the coasts of Liaoning, Hebei, Shandong, Jiangsu and Fujian provinces. Finless porpoises are known to be taken in various gillnet fisheries throughout their range (Zhou, K. and Wang, X., 1994; Jefferson, T. A. and Curry, B. E., 1994).</p> <p>There are some reports about Chinese white dolphin (<i>Sousa chinensis</i>) (Near Threatened) (IUCN Red List, 2008a) bycatch in fishing and stranding in the coastal waters in recent years (Wang, P-L and Han, J-B, 2007). Other cetacean bycatch in Chinese fisheries are False Killer Whales (<i>Pseudorca crassidens</i>) (Data Deficient) (IUCN Red List, 2008i), Indo-Pacific Bottlenose Dolphins (<i>Tursiops aduncus</i>) (Data Deficient) (IUCN Red List, 2008j) and Common dolphins, including Short-beaked Common Dolphin (<i>Delphinus delphis</i>) (Least Concern) (IUCN Red List, 2008f) and Long-beaked Common Dolphin (<i>Delphinus capensis</i>) (Data Deficient) (IUCN Red List, 2008k), probably also other species (Zhou, K. et al. 1995).</p>	<p>In Dutch fisheries, cetacean bycatch species - Harbour Porpoise (<i>Phocoena phocoena</i>), Grey Seal (<i>Halichoerus grypus</i>), Short-beaked Common Dolphin (<i>Delphinus delphis</i>), and Atlantic White-sided Dolphin (<i>Lagenorynchus acutus</i>), are under the category of ‘Least Concern’ on the IUCN Red List. In Chinese fisheries, cetacean bycatch species - Finless porpoise (<i>Neophocaena phocaenoides</i>) is under the category of ‘Vulnerable’ on the IUCN Red List, and Chinese white dolphin (<i>Sousa chinensis</i>) ‘Near Threatened’. Therefore, conservation statuses of cetacean bycatch species are different in Dutch fisheries than Chinese fisheries.</p>	
Invertebrates	<p>In the south-eastern North Sea between 1945 and 1983, there were bycatch of 7 fishes (sharks, rays, skates) and 10</p>	<p>Since the 1970s, there were bycatch of Lake Anchovy (<i>Coilia ectenes</i>), Tapetail Anchovy (<i>Coilia</i></p>	<p>There is lack of figures of the quantity of inver-</p>	

and fish bycatch	<p>invertebrate species (whelks, urchins, squids, crabs) in otter and beam trawlers fishery; where invertebrate bycatch of velvet swimming crab, slender spindle shell in beam trawlers (Philippart, C. J. M., 1997). No figure of the quantity of invertebrates and fish bycatch in Dutch fisheries has been found.</p>	<p><i>mystus</i>), juvenile fishes, shrimps and crabs in Japanese eel fishery. By 1990, trash fish and low value fish, including juveniles of commercial species, were already estimated by Chinese fisheries specialists to account for 70 percent of China's marine catch (Wang, S. and Zhan, B-Y, 1992). Monitoring of catch composition in the East China Sea in 1994 showed that this percentage had increased to 90 percent of the catch of the large-head hair-tail (<i>Trichiurus lepturus</i>), one of the major commercial species of the catch composition in the past (Qian, Z. and Yang, N., 1998; Zhong, Y. and Power, G., 1997). The shrimp fishery of China catches about 1.8 million tonnes of bycatch (Zhou, Y. and Yimin, Y., 1996). In 2003, there was a catch of low value and trash fish of 2,160,000 tonnes, out of a total marine catch of 9,730,000 tonnes in China. In 2004, there was a catch of about 3.3 million tonnes of low value and trash fish (Grainger, R., <i>et al.</i>, 2005).</p>	<p>tebrates and fish bycatch in Dutch fisheries to compare with Chinese fisheries.</p>	
Discard	<p>The most frequently discarded species in the Dutch pelagic fishery in 2002 was mackerel, of which around 50% of the catch was discarded (Couperus, A.S., <i>et al.</i>, 2004). From the discard sampling programme on the Dutch pelagic trawl fisheries in the North East Atlantic in the period 2003-2007, the overall discard percentage raised to fleet level was highest in 2003 (17%), and appears to be considerably lower (6%-8%) for the following years (2004-2007). Besides the discards which are sorted by the crew, it occasionally happens that part of or the total catch is discarded before the catch has been sorted, an incident referred to as "slippage". The discard composition and length frequency data shown</p>	<p>Chinese shrimp trawl fleets discard very little non-shrimp catches. All the bycatch is used, much for feeds for the Chinese aquaculture industry (Zhou, Y. and Yimin, Y., 1996). In S E Asia there has also been a growth in recent years in industry's which use bycatch from shrimp fisheries for human consumption (Chee, P. E., 1996).</p>	<p>There are extreme high ratios of discards in Dutch fisheries. There is very little discard in Chinese fisheries. Therefore, the quantities of the discards are different in Dutch fishery than Chinese fishery.</p>	

<p>above are therefore only based on routinely sorted discards. Accounting for a relative large part of the total annual discard estimates (17%-40% in weight), incidents of slippage are not frequently observed during the sampled trips between 2003 and 2007 (4%-8% of the sampled hauls). Discard percentages of the target species herring, horse mackerel and blue whiting (within the season) are relatively low (1%-6%). For mackerel the discard percentages appear to be significantly higher (16%-37% in the period 2003-2007). Boarfish is the most discarded non-commercial species. The present study suggests that, with the exception of mackerel, discarding of target species on an annual level (includes discard data of season) in the pelagic freezer fleet is low, concluding that this fishery has a high level of efficiency when targeting fish (Helmond, A.T.M. van and Overzee, H.M.J. van, 2009b).</p> <p>A discards sampling programme of the Dutch fishery for Nephrops in the North Sea was carried out in 2007 and 2008. This study shows that discards rates of Nephrops were high in the sampled trips and varied between 44%-79% in numbers and 32%-61% in weight. As well in numbers as in weight discards of Nephrops are higher than for all other species. Most Nephrops discards were larger than the minimum landing size indicating that there are problems with the market for 'smaller' individuals or problems with the quota. Besides Nephrops, the amount of bycatch of other benthos species in this fishery was much lower in comparison with observations in the Dutch beam trawl fishery. This is due to the different gears used in both fisheries. There is bycatch of flatfish and round-fish in this fishery. Dab was the most abundant fish species in the catch in all</p>		
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	<p>trips. Most of the dab is discarded because it undersized or has no or low economic value. Plaice was the most important bycatch in the landings. The absolute amount of discards per hour in the Nephrops fishery is much lower than for the beam trawlers. However, the calculated percentage discarded for plaice and dab are the same as in the beam trawl fishery (Helmond, A.T.M. van and Overzee, H.M.J. van, 2009a).</p> <p>A discards sampling program on the Dutch beam trawl fishery in the North Sea was carried out in 2008. The average percentage discards for sole was estimated at 16% in numbers and 6% in weight for the sampled vessels. This is the lowest discard rate observed for sole since 2002. Higher discard rates in previous years were caused by the strong year class of 2005. In 2008 this year class has reached marketable lengths and explains the drop in discard rates compared to the previous years, when year class 2005 was still abundant in the discarded part of the catch. The estimated discard rate for plaice in the sampled trips in 2008 is estimated at 84% in numbers and 53% in weight. Although variation between observed trips is high, the average discard rate is within the range as previous years, between 76% en 86%. Through time dab has been the most abundant species in the fish discards. Since 1976 the discard estimate of this species in numbers has varied between 91% and 99%. Also in 2008 the estimated discard rate, 95%, is within this range (Helmond, A.T.M. van and Overzee, H.M.J. van, 2010).</p>		
Seabird bycatch	No information on seabird bycatch in the Netherlands has been found.	In 2003, there were total estimated seabird bycatch 866 individuals in Chinese industrial pelagic longline tuna fishery (Dai, X., <i>et al.</i> , 2006).	No information on seabird bycatch in the Netherlands has been found to compare with

			China.	
Shark bycatch	No information on shark bycatch in the Netherlands has been found.	The shark bycatch species by set gillnets and drift-nets are <i>S. lewini</i> , <i>Hypoprion maccloti</i> , <i>Carcharias latistomus</i> , <i>Carcharias pleurotaenia</i> , <i>Carcharhinus menisorrah</i> and <i>Carcharhinus sorrah</i> . Where shark are abundant they comprise perhaps 30% of the total catch but in waters with fewer sharks the proportion is very small. The shark bycatch species by trawlers are mainly <i>C. sorrah</i> , <i>C. menisorrah</i> , <i>Scoliodon spp</i> , <i>Sphyrnidae</i> , <i>Chiloscyllium spp</i> and occasionally big <i>Rhincodon typus</i> and <i>Cetorhinus maximus</i> . It is estimated that shark bycatch of trawling amounts to 70-80% of total shark landings (Vannuccini, S. 1999). There were shark bycatch of silky shark, while short-fin mako, long-fin mako, crocodile shark, velvet dogfish in Chinese long-line pelagic fishery in 2008 (Dai, X-J and Zhu, J-F, 2008).	No information on shark bycatch in the Netherlands has been found to compare with China.	
Sea turtle bycatch	No information on sea turtle bycatch in the Netherlands has been found.	There was sea turtle bycatch of Leatherback ( <i>Dermochelys coriacea</i> ) (Critically Endangered) (IUCN Red List, 2000) in Chinese long-line pelagic fishery in 2008 (Dai, X-J and Zhu, J-F, 2008). But critically endangered Leatherback is not on National Wildlife Protection List (SFA, 1989).	No information on sea turtle bycatch in the Netherlands has been found to compare with China.	
By-catch impact on marine ecosystem	The bottom fisheries in the south-eastern North Sea had a considerable impact on several demersal fish and benthic invertebrates (Philippart, C. J. M., 1997).	The juveniles of fishes, shrimps and crabs which are caught by eel nets are important parts of the food chain in the Yangtze estuary. They are prey for <i>Leiocassis longirostris</i> , <i>Lateolabrax japonicus</i> , <i>Psephurus gladius</i> and endangered Chinese sturgeon ( <i>Acipenser sinensis</i> ), as well as other commercial and rare fishes. Therefore, a great	No big difference in the impact of bycatch on marine ecosystems between the Netherlands and China has been found. There are big impact of bycatch on	

		number of juvenile bycatch of these species in eel fishing will also cause adverse effects on the growth of these commercial and rare fishes (Zhang, H., et al., 2007).	marine ecosystems both in the Netherlands and China.	
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Table 4 Comparing the current situation of marine conservation awareness between the Netherlands and China

Aspect	In the Netherlands	In China	Differences	Action points
NGOs	Kust en Zee has started the Dolphin Saver project for reducing cetacean bycatch in Dutch fishery (K&Z, 2010). The campaign 'Sustainable seafood on the menu' was launched in January 2010 by WWF Netherlands and the Royal Restaurant Association. The launch of a pilot for online MSC Chain of Custody certification for independent restaurants is part of the campaign (MSC, 2010c). The North Sea Foundation (Stichting Noord Zee) has published the fourth edition of the Fish Guide with the cooperation with WWF (Goede VIS, 2010a). Its Goede VIS project is to promote 'Green fish'. This project including informing the public which supermarkets, restaurants and other places selling sustainable fish (Goede VIS, 2010b), and providing the recipes with sustainable fish (Goede VIS, 2010c).	There is no project on cetacean bycatch reduction or sustainable fishery from NGOs in China such as WWF (WWF China, 2010), Greenpeace (Greenpeace China, 2010) or Friends of Nature (FON China, 2010).	There are projects on cetacean bycatch reduction, like the Dolphin Saver project from Kust en Zee, and sustainable fishery, like campaign 'Sustainable seafood on the menu' from WWF Netherlands and the Royal Restaurant Association, Goede VIS project and the Fish Guide from the North Sea Foundation in the Netherlands. There is no project on cetacean bycatch reduction or sustainable fishery from NGOs in China. Therefore the awareness of NGOs on cetacean bycatch reduction and sustainable fishery in the Netherlands is different from China.	Developing projects on cetacean bycatch reduction and sustainable fishery with NGOs in China from the experiences in the Netherlands.

The public	<p>Seafood consumers in the Netherlands are willing to contribute to sustainably fishery by purchasing sustainable seafood products. According to the marketing research on the attitudes of consumers toward sustainable seafood by the Seafood Choices Alliance with the cooperation of the North Sea Foundation, Greenpeace and WWF, more than half of the consumers are aware of turtle and dolphin bycatch and overfishing in general. More consumers are concerned about overfishing (78%) than bycatch (67%), but they consider both issues important in making seafood purchases. About one third of the consumers purchase 'Dolphin Safe Tuna', and avoid "hard-discount" stores since that 'cheap' fish is "bad" fish, and farmed salmon. Up to 50% of consumers have avoided buying seafood that they know is not sustainable. Most of the consumers purchase seafood in large supermarkets, since they give broad permission for retailers to source sustainably and educate consumers about better choices. Consumers want more information on sustainable seafood and point of purchase labelling. They also want government and retailers to bear most of the responsibility for providing sustainable choices (Seafood choices Alliance, 2010).</p> <p>Individual retailers in the Netherlands, such as Albert Heijn, Super de Boer, C1000, Plus, Jumbo, DEEN, Dekamarkt, Dirk van den Broek, are actively seeking MSC (Marine Stewardship Council) certified seafood products (MSC, 2010c). MSC labelled fish products are sold in most of the super-</p>	<p>The public in China supports shark fishing, the fishermen in Hainan Province are praised for shark fishing (hinews, 2009), despite the fact that shark fishing is illegal (zhidao.baidu.com, 2010). Many people, even some fishing inspectors from the government, do not know the prohibition of the legislation on shark fishing (Wang, Y., 2007). China has always chosen to support whaling in IWC conferences since 2000. The public in China supports whaling, and regards it good for marine resources, suitable for Chinese own situation and resists other countries stopping China from whaling (Lanyaya, 2010).</p> <p>Some MSC labelled fish products which are from the companies in other countries for sale in China, but no information on Chinese retailers which are involved in the sale of MSC labelled fish products has been found (MSC, 2010e).</p> <p>The awareness of MPA (marine protected areas) regulations was extremely low amongst local communities in China. According to 69 semi-structured interviews with representatives of key stakeholder groups from the selected MPAs in the programme of policy analysis coupled with three in-depth case studies of MPAs in China, including fishermen and other community members, tourism operators, industrial developers and local governments, as well as NGOs, scientists and decision-makers at various levels, not a single local fisherman interviewed was aware of the fact that he was fishing in an officially</p>	<p>Seafood consumers in the Netherlands are aware of the impact of turtle and dolphin bycatch, and want to contribute to sustainable fishery by purchasing 'Green Fish', such as 'dolphin safe' tuna. This fact reflects the attitude of the public in the Netherlands towards sustainable fishery. In China, the public is not aware that shark fishing is illegal, and supports it; the public regards whaling good, and support it. These two facts reflect the attitude of the public in China towards sustainable fishery. Therefore, the attitude of the public towards sustainable fishery in the Netherlands is different from China.</p> <p>No information on Chinese retailers which are involved in the sale of MSC labelled fish products has been found to compare with the Netherlands.</p> <p>No information on the awareness of fishermen or</p>	Raising the awareness of the public on the impact of bycatch and overfishing on marine ecosystems in China.
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	<p>markets in the Netherlands (MSC, 2010b). Several of the larger suppliers of foodservice sector in the Netherlands like Seafood Parlevliet have obtained MSC Chain of Custody certification and have launched products bearing the MSC label. Dutch airline Royal KLM is the first airline in the world to serve MSC-certified seafood. Dutch contract caterer Sodexo has obtained MSC Chain of Custody certification. Umoja restaurant in Amsterdam has been certified for MSC Chain of Custody. As well as 6 more independent restaurants, including Jamie Oliver's Fifteen and the first fish restaurant De Parel van Vreeswijk in Nieuwgein (MSC, 2010c).</p> <p>No information on the awareness of fishermen or local communities on the regulations of marine protected areas has been found.</p> <p>No information on the awareness of the public on the function and performance of protected areas in the Netherlands has been found.</p>	<p>no-take area. When the MPA regulations were explained to them, 95% of the fishermen expressed that completely eliminating fishing from MPAs was unfair and unrealistic, a view that was also shared by MPA enforcers and managers. One MPA manager pointed out that under the current circumstances, even informing local communities of the official MPA regulations would potentially cause “waves of opposition” and is counter-productive to MPA management (Qiu, W. and Jones, P. 2009).</p> <p>The awareness of the public on the function and performance of protected areas is very low. A nation-wide survey in 2005 showed that only 18.1% of the 4,120,517 people surveyed believed that protected areas helped to improve environmental quality (ACEF, 2005).</p>	<p>local communities on the regulations of marine protected areas in the Netherlands has been found to compare with China.</p> <p>No information on the awareness of the public on the function and performance of protected areas in the Netherlands has been found to compare with China.</p>	
Fishery stakeholders	<p>Many Dutch fisheries have achieved MSC certification, such as North Sea herring fishery, Ekofish Group North Sea plaice fishery, North East Atlantic mackerel fishery, et cetera. Over 140 of the 400-plus exporters and processors in the Netherlands have obtained MSC Chain of Custody certification (MSC, 2010c).</p> <p>Dutch fishermen organisation ‘Nederlandse Vissersbond’ works together with Kust en Zee on Dolphin Saver testing for reducing cetacean by-</p>	<p>There is no MSC certified Chinese fishery (MSC, 2010d).</p> <p>Incidentally captured small cetaceans did not occupy an important place in the daily life of people in coastal China, and they were discarded in the sea or sold at a very low price in fish markets (Yang, G., et al., 1999). Usually the carcasses of entangled Finless porpoises are sold to local people for use as livestock feed (Zhou, K. et al. 1995).</p>	<p>Many Dutch fisheries, exporters and processors in the Netherlands have achieved MSC certification. There is no MSC certified Chinese fishery. Therefore, the attitudes of the stakeholders of Dutch fishery towards MSC certification programme are different than which of Chinese fishery.</p>	MSC certifying Chinese fisheries.

<p>catch in Dutch fishery (K&amp;Z, 2010).</p> <p>No information on the attitude of Dutch fishermen on sea turtle bycatch has been found.</p> <p>The fishermen from the Integrated Fisheries Foundation (Stichting Geïntegreerde Visserij) see the sustainable fishery as the only future for the fishery, which in their eyes is small-scale coastal fishery with a quality and a wider variety of fish, crustaceans and shellfish. They want to gain more science and research knowledge about different ways of fishing and other species by exchanging experiences with other stakeholders. They want to work together with others in practical pilot projects to reach their vision of the future fishery (The Integrated Fisheries Foundation, 2010).</p>	<p>The fishermen sell sea turtle bycatch to the restaurants or aquaria in China (Zhangpuxiaoyu, 2010; news.zj.com, 2007).</p> <p>In order to control the increase of fishing effort and protect the blasted marine fishery resources, the central government in China has issued Summer Closed Fishing Season System in 1995 (Gao, J., 2006). But some fishermen go on fishing protected fish species in Summer Closed Fishing Season, because the price of fresh fish is higher, according to secretly interviewing fishermen at the beginning of summer closed fishing season in Weihai City (bbwfish.com, 2005). According to an interview done by World Fishing with a fisheries trade officer at a Western embassy in Beijing, the Fisheries Bureau in China has not started a quota on coastal fish capture unlike the EU's quota arrangement. Sometimes there is a planned quota but the challenge is how to organise the system. Fishing industry policy is not only made by the Fisheries Bureau but must involve the local community. They cannot introduce a quota without that (World fishing, 2009).</p>	<p>The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on cetacean bycatch to compare with the attitudes of Chinese fishermen on cetacean bycatch.</p> <p>No information on the attitude of Dutch fishermen on sea turtle bycatch has been found to compare with Chinese fishermen.</p> <p>The attitude of one fishermen organisation is not enough to reflect the attitude of all fishermen organisations in the Netherlands on sustainable fishery to compare with the attitudes of Chinese fishermen on sustainable fishery.</p>	
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