

近海 与虾池赤潮

Jinhai yu Xiachi Chichao

徐家声 著



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内容简介

本书是 1989~1992 年在渤海近海及虾池进行赤潮监测及研究工作的总结,主要内容有:对我国历史上记录到的最大的 1989 年渤海湾赤潮的描述及成因,以及对该海域 1990~1992 年进行的赤潮监测、防治所获得的资料进行的全面分析研究的成果。全书共分 11 章,首先对赤潮的概念、监测及研究方法和国内外的赤潮状况、研究动态作了较全面的叙述,对研究区的海洋环境作了较全面的介绍,并从海水理化因子与富营养化、浮游植物与赤潮生物、叶绿素 a 与初级生产力和赤潮的关系、水文气象条件对赤潮形成及消失的影响等方面对 1989~1992 年渤海近海及虾池赤潮进行了全面的介绍及研究。本书着重从海洋环境及海洋开发活动入手,综合分析了赤潮的形成原因,最后提出了一套来自实践的适合我国的赤潮防治方法。书末附有参考文献及赤潮生物图谱,以供参考。

本书具有较强的科学性和可操作性,不仅是从事水产、环保的专业人员的参考书,而且可供从事养殖及捕捞的人员阅读,同时还是海洋和水产专业师生以及从事赤潮研究的科技工作者的参考书。

Brief Introduction of the Book Content

This book is the summation of monitoring and studying activities in the recent years for red tide occurring in shrimp ponds and in coastal waters. It is written with emphasis not only on the case study of the 1989 red tide occurred in Bohai Sea, which is the worst red tide case recorded in historical literature, but also on the comprehensive analysis of the data, information, and achievement, which are obtained in the period from 1990 to 1992 when the monitoring, prevention, and treatment related to the red tide were conducted in the field. The book consists of 11 chapters, to start with the concepts of red tide, monitoring approach and research method are comprehensively described. Along with the introduction of the marine environment of the discussed sea, the relationships between physicochemical factors and eutrophication, between plant plankton and red tide organisms, the relationship among chlorophyll-a, primary productivity and red tide, are all studied for explanation of the red tide occurred in the period from 1989 to 1992 in the nearshore shrimp ponds and the coastal waters of Bohai Sea. The causes of the red tide formations are comprehensively analyzed in the book after the marine environmental conditions and the marine exploitation activities related to the red tide occurrence have been specially emphasized. Finally a set of methods obtained from the practice and suited to the domestic conditions are proposed for preventing from red tide and for treatment after red tide has occurred. At the end of this book references about red tide and illustrative pictures of the red tide organisms are appended.

序 言

我国近岸海域及虾池的赤潮近年来时有发生。赤潮不仅破坏了海洋环境,而且给海洋捕捞及养殖业造成严重的经济损失。在1989年渤海发生特大赤潮后,我国政府对赤潮灾害更为重视。目前,我国海域已陆续开展赤潮的监测、防治及研究工作,特别是1990年由辽宁、河北、天津和山东组成的环渤海赤潮防治领导小组实行国家海洋局与地方有关部门、科技人员深入现场与沿海群众相结合的赤潮防治与管理的方法,积极开展赤潮的监测及防治工作。1990~1992年在河北省沿海的黄骅市、唐海县、秦皇岛市设立了赤潮监测点,对海洋环境、水质变化、赤潮的生消过程进行了定时定点的监测及研究,取得了大量的资料及丰硕的成果。《近海与虾池赤潮》一书,就是对这些资料分析研究的总结。

该书以黄骅为重点,以河北沿海为辅线,并涉及国内外近年来的赤潮研究状况及成果,简明扼要地介绍了赤潮与自然环境、人为因素的关系,以及赤潮的成因和防治方法。该书不仅具有科学性而且具有可操作性,它将推动我国赤潮研究的深入,促进赤潮监测及防治工作的发展,对保护海洋环境、减轻海洋污染、提高海洋捕捞及养殖业的收益等方面都将起到积极的作用。

原国家海洋局局长

严宏谟
一九九〇、三、五

前 言

渤海是我国内海,周围的辽宁省、河北省、天津市及山东省在改革开放以来,国民经济迅速发展,海洋开发活动的范围及规模大增,渤海污染状况随之加剧,导致赤潮肆虐,渤海海域已成为我国赤潮的重灾区之一。当前我国政府实施了大规模的治理渤海污染防治赤潮的行动计划,决心使遭受污染的渤海重现碧海景色,为子孙后代造福。为了实现这一宏伟计划,必须回顾历史,展望未来,总结教训,发扬成绩,需要进行长期而又艰苦的工作。为此,特将渤海湾的黄骅、唐海及秦皇岛在1989~1992年期间的赤潮监测、防治及研究工作成果介绍给大家,希望大家在工作中予以借鉴和指正。该项目的监视、监测及研究工作起止于1989~1992年,本书编写及参考资料引用的时间截止于1994年。10余年的时光转瞬即逝,回眸1989年在我国渤海发生的最大一次赤潮及其后几年的监测、防治及研究工作的往事,这对于用今天的科学思维和理念,站在当今的理论和水平的高度上去审视那一段历史,总结经验、吸取教训,做好目前的工作,显得尤为必要。

自1980年以来我国的赤潮研究渐趋深入,那是因为我国赤潮频繁发生,范围渐趋扩大,造成的危害日益严重,越来越引起人们的重视和注意。国家和沿海省市各级政府已把赤潮列为海洋灾害,并在全中国范围内开展了赤潮研究及防治工作,这使我国的赤潮研究水平有了较大地提高,在大连、天津、黄骅、上海、舟山、厦门、广州及海南省沿海及港台地区的赤潮及其研究成果报道日渐增多。1989年在渤海发生了赤潮,位于渤海西南岸的河北、天津、山东等地海域灾情都十分严重,海洋捕捞及对虾养殖大幅减产,经济

损失达 2 亿多元。国家海洋局对此十分重视,时任监测管理司司长的鹿守本就此次赤潮的成因、危害及保护海洋环境、减少赤潮灾害等问题在《中国海洋报》发表重要讲话,并立即在北京召开了由黄骅灾区、国家海洋局北海分局、河北省海洋局有关领导以及在现场进行赤潮监测的国家海洋局第一海洋研究所的科研人员参加的座谈会,了解灾情及赤潮发生过程。中央电视台、人民日报及地方报纸都对此次赤潮灾情作了报道。国家海洋局迅速成立了由辽宁、河北、天津、山东三省一市参加的环渤海赤潮防治领导小组,并于 1990 年首次在我国开展了大规模的渤海近海及虾池的赤潮监测、研究、防治及管理工作,重点是现场监测和防治方法的研究。国家海洋局环保处自始至终参与该项工作,特别是主管该项工作的王飞副处长作了大量协调工作,以北海分局为组长单位的环渤海赤潮防治领导小组及河北省科委、海洋局对该项工作予以了大力支持,周学范、刘武昌、孔繁荣、孟毅、程振波、辛春英、吕成功、高建西、李冰、李勃、白瑜生、张世魁、钟献盛、王安利、宋兴安等参加了赤潮监测及研究工作。

1989~1992 年以黄骅为重点,在河北省近海及虾池对赤潮进行了多学科的综合监测及研究,并对国内外的赤潮状况及研究成果作了较深入的了解和分析,在取得大量现场监测数据和资料的基础上对海水理化因子、气象、水动力、浮游动物、浮游植物、叶绿素 a、初级生产力等自然环境要素和污水排放、海域污染等人为因素进行了全面的分析、研究,着重讨论环境因子与赤潮的关系及影响。此外,在黄骅、唐海及秦皇岛还开展了因地制宜的赤潮防治及管理工作,摸索出一套适宜在当地实施的赤潮防治经验与方法,这些经验与方法有不少可在国内推广和应用。我国在黄骅首次设立的赤潮监测点,不仅获得了我国连续 4 年的定期、定点的赤潮监测的资料,而且找到了一条适合我国国情的监测与研究、防治与管理、科技人员与沿海群众、国家与地方有关职能部门相结合地进行

赤潮监测、研究、防治及管理的新途径,对我国今后开展赤潮的监测与防治工作将起到积极的推动作用。

在该项研究工作中不仅得到了国内赤潮专家的支持和帮助,而且加强了与国外的交流和合作,使近海及虾池赤潮的研究迈出了可喜的一步。

本书的编写和出版历经周折、几经修改,终于出版了,兴奋之情难以言表,在这一时刻,我要对当时予以该项工作大力支持各位领导、专家、学者:国家海洋局严宏谟局长,监测管理司鹿守本司长;暨南大学齐雨藻教授,中国科学院海洋研究所郭玉洁、邹景忠、周名江、高尚武研究员,中国水产科学院黄海水产研究所康元德研究员,青岛海洋大学李永祺、王筱庆教授,国家海洋局海洋环境保护研究所黄文祥高级工程师和国家海洋局第一海洋研究所吴宝铃研究员及王文兴、吕培顶、蓝乾文、蒲书箴、张德玉研究员,天津市环保局安敦及沧州地区环保局污染监测站朱卫东高级工程师、轻工业部制盐研究所谢春泉、国家海洋局北海分局何元成副局长、王广俊副局长、于蔚处长表示衷心地感谢!并对国家海洋局、国家海洋局北海分局、环渤海赤潮防治领导小组、河北省科委、河北省海洋局、河北省黄骅市人民政府及黄骅市南排河镇政府的大力支持表示由衷的谢意!

徐家声
2003年3月

Foreword

Bohai Sea is an inland sea of China and it is bounded by Liaoning Province, Hebei Province, Shandong Province, and Tianjin, where the economics have been rapidly developed, and the scale of the marine exploitation activities have been enlarged since China adopted the policies for economical reformation and for opening to the world. Therefore the pollution degree and red tide situation in Bohai Sea have become worse. Bohai Sea is becoming an area of the most seriously polluted areas. At the present Chinese government carries out a large scale project of action for both prevention from pollution and red tide occurrence and for environmental improvement in Bohai Sea.

It is determined that all the polluted area of Bohai Sea will be changed into the blue clean waters with beautiful scene. In order to realize the great project and to benefit future generations, it is necessary to conduct a long-term hard work. First of all it is essential for us to review the achievement of both the prevention from red tide and the environmental improvement in Bohai Sea and to learn some lessons and good experiences about it. Here the results of monitoring, treatment for red tide, prevention from red tide, and related research works in the period of 1989 - 1992 in Huanghua, Tanghai and Qinhuangdao, which are adjacent to Bohai Sea, are introduced to our readers in order to be used as references and to ask for any suggestion improving this report. More than 10 years of

time has been passed since the 1989 red tide, which occurred in an extensive area. Let us look back on that case and on all the works, which were conducted about the red tide monitoring, prevention, treatment, and the related research works after it had occurred, and review the past from the standpoint of the up-to-date theory by means of scientific thinking.

Thorough investigation and study of red tide have been conducted in China since 1980 because of its frequent and extensive occurrence and its seriously harmful degree. Red tide draws more and more attention of people. The governments at all levels in the coastal provinces of China treat red tide as a marine disaster, and lead all the works of red tide prevention and treatment, and organize all the research activities to raise the research level of China. News of red tide occurrence and research achievement have been reported more frequently and have become the public concerns in Dalian, Huanghua, Tianjin, Shanghai, Zhoushan, Xiamen, Guangzhou, Hainan, Hongkong and Taiwan. In 1989 the red tide occurred in Liaodong Bay, Bohai Bay and Laizhou Bay. Its harmful degree was serious in the coastal waters of Hebei, Tianjin and Shandong, i. e. the waters near the southwest coast of Bohai Sea. The red tide caused the heavy decrease of the products in aquaculture and marine fishery such as Pacific Prawn. The economical losses was as much as two hundred million yuan. State Oceanic Administration (SOA) paid great attention to the red tide situation at that time. Director Lu Shouben of Marine Monitoring and Management Department convinced a meeting in Beijing to grasp the red tide situation. He made an important speech about it, which was published in "Chinese Ocean News". The leaders from the Huanghua area,

North Branch of State Oceanic Administration, and Hebei Oceanic Administration, and the scientists from First Institute of Oceanography in charge of the red tide monitoring in the sea area took part in the meeting. CCTV, People's Daily, and local newspapers reported about the red tide. State Oceanic Administration organized a leading group consisting of the members from the 3 provinces (Liaoning, Hebei and Shandong) and the city (Tianjin). Then the works related to the red tide monitoring in the shrimp ponds and the coastal waters of Bohai Sea, the related research, the prevention, the treatment, and the management about the red tide were all started in 1990 with emphasis for methods of the field monitoring, the prevention and the treatment. This is the first time in China to carry out this kind of large scale project. Marine Environment Protect Division of State Oceanic Administration (SOA) led the project from the beginning to the end. Director Mr. Wang Fei of the division coordinated all the aspects of the project. North Branch of SOA, which headed the leading group for red tide prevention and treatment in Bohai, Hebei Science committee, and Hebei Oceanic Administration made great supports to the project. Zhou Xuefan, Liu Binchang, Kong Fanrong, Meng Yi, Cheng Zhenbo, Xin Chunying, Lu Chenggong, Gao Jianxi, Li Bing, Li Bo, Bai Yusheng, Zhang Shikui, Zhong Xiansheng, Wang Anli and Song Xing'an participated the red tide monitoring and the research activities.

Comprehensive monitoring and multi-disciplinary studies of the red tide occurring in shrimp ponds and coastal waters of Hebei Province were conducted in the period from 1989 to 1992 within an intensive observational area at Huanghua. In addition, the status

and achievements in red tide studies of China and foreign countries were studied and learned. Based on a large quantity of the data and information obtained in the observational field, the environmental factors such as the physicochemical measurements, hydrographic and meteorological observations, and the measurements for plant plankton, animal plankton, chlorophyll-a, and primary productivity, and the man-made factors such as sewage discharge and marine pollution are all analyzed and investigated in order to bring into focus on the relationship between the factors and the red tide occurrence, and the effects of the factors on the red tide occurrence. Furthermore measures were adopted in accordance with the local conditions of Huanghua, Tanghai, and Qinhuangdao for the prevention from red tide occurrence, treatment after it has occurred, and the related administrative management for red tide. The obtained experiences and the measures adoptable in these places can be spread into other places and extensively used in China. A red tide monitoring station was set up in Huanghua for the first time. Not only a series of data were periodically obtained at the station in the 4 years in succession but also a new way for the monitoring, the prevention, the treatment, the administrative management related to red tide was found out. The way is suited to the domestic conditions integrating the scientific workers in the speciality with the public in the coastal area, and combining the administration of the central government and the management of the local governments for these purposes. Thereafter the development of the monitoring, the preventing, and the treatment related to red tide is actively facilitated.

The domestic experts in this speciality came to assist when the

project was implemented. The international cooperation and exchange became strengthened at the same time. Hence comes a new stage in the studies of red tide occurring in shrimp ponds and coastal water.

Finally the book is to be published in the manuscript revised many times after many setbacks. It is exciting with a pleasure indescribable.

The book is written with scientific features. It is practicable and able to be used as reference for the professionals engaged in aquatic production and environmental protection. It can be read by the specialists of Aquaculture and fishing industry. It is helpful not only to teachers and students in the specialties such as oceanography and fisheries sciences but also to the scientific workers engaged in the red tide studies.

Here I express my heartfelt gratitude to all the leaders, experts, and scholars who have supported for the project. They are Mr. Hongmo Yan, the former director of SOA; Prof. Qi Yuzao of Jinan University; Prof. Guo Yujie, Prof. Zou Jingzhong, Prof. Zhou Mingjiang, Prof. Gao Shangwu of Oceanography Institute of Academia Sinica; Prof. Kang Yuande of Yellow Sea Fisheries Research Institute of "Chinese Academy of Fisheries Sciences"; Prof. Li Yongqi, Prof. Wang Xiaoqiong of Ocean University of Qingdao; Prof. Huang Wenxiang of "Institute of Marine Environmental Protection" of "State Oceanic Administration"; Prof. Wu Baoling, Prof. Wang Wenxing, Prof. Lu Peiding, Prof. Zhang Deyu of "First Institute of Oceanography" of "State Oceanic Administration"; Senior Engineer Mr. An Dun of "Tianjin Environmental Protection Bureau"; Senior Engineer Mr. Zhu

Weidong of "Pollution Monitoring Station of Cangzhou Environmental Protection Bureau"; Dr. Xie Chunquan of "Institute of Salt Industry" of "Light Industry Department"; Deputy Director Mr. He Yuancheng, Deputy Director Mr. Wang Guangjun, Dr. Yu Wei of North Branch of State Oceanic Administration. Also many thanks to State Oceanic Administration, North Branch of State Oceanic Administration, Leading Group for Protection and Treatment of Red Tide in Bohai, Hebei Science and Technology Committee, Hebei Oceanic Bureau, Huanghua people's Government and Nanpaihe Town of Huanghua.

推荐者的话(一)

我国的赤潮研究工作近几年有了很大发展,从南到北各海域都在进行赤潮的监测研究及防治管理工作。由于国家的重视,人们对赤潮的了解及防治意识普遍增强,研究水平迅速提高,学术交流日趋活跃,我国的赤潮研究工作呈现出喜人的局面。

由于赤潮研究在我国开展较晚,全面反映我国赤潮研究状况,指导赤潮研究工作,介绍赤潮防治及管理经验等方面的书籍很缺乏,不能满足我国目前赤潮研究深入发展的需要。《近海与虾池赤潮》一书的出版是十分必要和有益的。

该书资料丰富,在赤潮现场获得的许多第一手资料对我国今后进行赤潮研究具有重要的参考价值。通过国内外赤潮状况的介绍,自然及人为因素对赤潮的影响,赤潮成因分析及防治方法的介绍,作者较全面地反映了我国赤潮研究的现状及水平。为此我愿把这本理论与实践相结合,科学性与可操作性相结合的赤潮研究专著推荐给从事赤潮研究的科技人员、环境保护工作者以及从事海水养殖及捕捞的人们。

SCOR - IOC 赤潮工作组
中国委员会主席

齐西萍
8/25/94

推荐者的话(二)

近年来我国的赤潮研究工作在政府有关部门的支持和广大科技工作者的积极参与下发展迅速,学术交流活动空前活跃,研究水平迅速提高,人民群众的赤潮意识普遍增强。了解赤潮成因,开展赤潮的防治,使赤潮的研究与渔业生产相结合,促进国民经济的发展已成为科技工作者与从事海水养殖及捕捞业的人们的共同心愿,人们迫切需要有一批既具有较高理论水平,又能应用于生产实践的赤潮研究的书籍,而《近海与虾池赤潮》一书是作者多年深入生产第一线进行赤潮研究的成果,是一本理论与实践相结合,并具有较强的可操作性的赤潮研究专著。该书反映了我国当前赤潮的研究水平,相信该书的出版会受到广大科技工作者及从事养殖及捕捞的人们的欢迎,我希望这本书能早日问世。

原青岛海洋大学生物系主任,教授

李永洪
1992.6.4