



PROJECT DOCUMENT

ACHIEVEMENTS FOR YEAR 2019

Project ID: 201302001

Program Category	ASEAN-SEAFDEC ASSP and FCG Mechanism		
Project Title	Chemicals and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins (ASP, AZA and BTX) and Harmful Algal Blooms (HABs) in the ASEAN Region		
Program Strategy No.	III	Total Duration	2013 - 2019
Lead Department	Marine Fisheries Research Department (MFRD)	Lead Country	Singapore
Donor/Sponsor	Japanese Trust Fund (JTF)	Total Donor Budget	USD 274,914
Project Partner	None	Budget for 2019	USD 39,850
Project Leader	Ong Yihang / MRFD	Project Participating Country (ies)	All Member Countries

PART I: OVERALL PROJECT DESCRIPTION

1. Brief Project Description:

Consumption of a variety of shellfish and fish which have been contaminated by marine biotoxins causes an increasing number of human intoxications and even deaths around the world. This project is an extension of the Japanese Trust Fund II project on Biotoxins Monitoring in ASEAN and aims to address the needs of Member Countries and continue with capability building in biotoxins analyses and monitoring, with the proposed focus on other biotoxins like Amnesic Shellfish Poisoning (ASP) toxin (Domoic Acid) and Azaspiracids (AZA). The project will also include a component on the identification of toxic Harmful Algal Blooms (HABs) species. This project will be implemented by Post-Harvest Technology Centre of the Agri-Food and Veterinary Authority of Singapore (PHTC/AVA) as SEAFDEC's Collaborating Center for MFRD programmes, with participation from the ASEAN-SEAFDEC Member Countries. The key project activities comprise of a Regional Technical Consultation meeting, a Regional Training Course in Biotoxins Analyses and a biotoxins monitoring survey. In addition, there will also be a Regional Technical Consultation and Regional Training Course, which will be organized in collaboration with IOC (Intergovernmental Oceanographic Commission of the UNESCO) Sub-Commission for the Western Pacific (WESTPAC), for the identification of toxic HAB species. These project activities will culminate in a Technical Compilation publication and an End-of-Project meeting. It is envisaged that by the end of the project, Member Countries would have achieved the project's objectives of upgrading their laboratory capabilities and credibility testing for ASP, AZA and BTX biotoxins, establishing biotoxins monitoring programmes for routine surveillance testing of fish and fisheries products, improving their knowledge and understanding on the levels of biotoxins occurrences and incidences in fish and fisheries products in the ASEAN region as well as of toxic HAB occurrences and incidences in the region, and enhancing their capabilities for the identification of toxic HAB species to ensure that fisheries products are safe for consumption. The expected outputs of this project are: a regional training course in AZA, ASP and BTX biotoxins analyses, a regional training course in identification of toxic HAB species, biotoxins monitoring surveys in Member Countries, and a Technical

2. Background and Justification:

Marine biotoxins represent a significant and expanding threat to human health in many parts of the world. The impact is visible in terms of human poisoning or even death following the consumption of contaminated shellfish or fish, as well as mass killings of fish and shellfish, and the death of marine animals and birds.

The Codex Alimentarius Code of Practice for Fish and Fishery Products (CAC/RCP 52-2003) defined biotoxins as poisonous substances naturally present in fish and fishery products or accumulated by the animals feeding on toxin producing algae, or in the water containing toxins produced by such organisms.

Monitoring seafood for toxicity is essential to manage the risks. However, there are several limitations in monitoring for toxicity such as the variation in toxin content between individual shellfish, different detection and even extraction methods for the various toxins, requiring a decision which toxins one is testing for, and the frequency of sampling to ensure that toxicity does not rise to dangerous levels in temporal or spatial gap between sampling times or locations. Furthermore, the growing harvest of non-traditional shellfish (such as moon snails, whelks, barnacles, etc) may increase human health problems and management responsibilities.

MFRD has conducted a project on biotoxins monitoring in ASEAN from 2009 to 2012 to increase the attention in expanding and improving initiatives to monitor, detect and share information on marine biotoxins in order to reduce the public health risks associated with the consumption of contaminated shellfish and fish. The project had covered training in analytical methods for Diarrhoetic Shellfish Poisoning (DSP) toxins, lipophilic toxins, Paralytic Shellfish Poisoning (PSP) toxins and Tetrodotoxin (TTX) and a monitoring survey on PSP toxin in ASEAN Member Countries.

This project is an extension of the previous project to address the needs of Member Countries and continue with capability building in biotoxins analyses and monitoring, with the proposed focus on other biotoxins like Amnesic Shellfish Poisoning (ASP) toxin (Domoic Acid) and Azaspiracids (AZA). These 2 biotoxins were raised as part of the training needs by Member Countries during the RTC of the previous project in 2009. Brevetoxins (BTX) which causes Neurotoxic Shellfish Poisoning (NSP) is also recommended to be included in the new project as ASP, AZA and BTX, along with DSP and PSP, should be regulated according to CODEX for shellfish.

During the End-of-Project Seminar for the biotoxins monitoring project in 2012, Member Countries also pointed the importance of identifying toxic HAB species to complement existing biotoxins monitoring programmes to ensure that fish and shellfish are not contaminated with toxic algae or their toxins. Member Countries suggested that MFRD consider conducting a project on toxic HABs to enhance regional capabilities for the identification of toxic HAB species. MFRD has taken up this suggestion by including a separate component on toxic HAB species identification within this project.

The key stakeholders/beneficiaries of this project are the relevant agencies in the fisheries department of the ASEAN-SEAFDEC Member Countries which are responsible for ensuring the safety of fish and shellfish for consumption and for monitoring and testing of fish and shellfish; the aquaculture farmers and harvesters of the fish and shellfish; as well as the consumers/buyers, international and domestic.

This project is in line with the following Resolution and Plan of Action as endorsed at the ASEAN-SEAFDEC Conference of 2011:

Resolution 21: Improve technologies and facilities to ensure fish quality assurance and safety

management systems, taking into account the importance of traditional fishery products and food security requirements, and promote the development of fishery products as an alternative supplementary livelihood for fisheries communities.

Plan of Action D61: Strengthen fish quality and safety management systems that support the competitive position of ASEAN fish products on world markets, including moving towards ISO/IEC 17025 accreditation of national fish inspection laboratories, strengthening capacity and acknowledging the recognized national laboratories, risk analysis and equivalence agreement such as the Mutual Recognition Agreement (MRA) and promote the implementation of the quality and safety management systems among small and medium enterprises in the ASEAN region.

Plan of Action D63: Promote and conduct training programs and develop training materials to upgrade the technical skills and competencies of personnel in the public and private sectors on fisheries post-harvest technology and food safety management system.

This project is also in line with the SEAFDEC Program Thrust II on Enhancing Capacity and Competitiveness to Facilitate International and Intra-regional Trade.

Proposed Project Extension 2018-2019:

In 2016, Member Countries highlighted challenges faced in implementing the biotoxin monitoring surveys due to manpower and technical constraints. As a result, implementation of the survey in a few countries were delayed by a number of months such that the survey duration of one and half years could not be achieved by the end of 2016. As such, Member Countries requested to extend the biotoxin monitoring survey till the end of 2017 to enable them to complete their survey plans so that more results and data can be gathered for a better understanding of HAB occurrences.

During the Regional Training Course on Identification of HAB Species in the ASEAN Region in 2016, Member Countries highlighted the need for more training on specimen preservation and culturing techniques for identification and monitoring of HAB species. As such, Member Countries requested that MFRD organize additional training courses on these topics to enhance the region’s capabilities in managing toxic HAB incidences.

In view of all of the above, MFRD proposes to extend the project for another two years i.e. 2018-2019, to enable Member Countries’ requests for extension of the biotoxin monitoring survey period and additional regional training courses on HAB to be incorporated as additional activities in 2017-2018 while the project’s final year’s activities i.e. publication of a Technical Compilation and an End-of –Project Seminar will now be conducted in 2019.

3. Project Overall Objectives, Outcomes, Outputs, Indicators and Activities:

3.1 Objectives, Outcome and Output of the Project

Objective	Outcomes	Outputs	Activities
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Objective 1: To upgrade regional laboratory capabilities and credibility for testing of ASP, AZA and BTX biotoxins	Outcome 1: Enhanced laboratory capabilities and knowledge in the testing of ASP, AZA and BTX biotoxins	Regional training course in biotoxins (AZA, ASP and BTX) analyses	Organization and conduct of Regional Training Course in Biotoxins (AZA, ASP and BTX) Analyses, 2-6 June 2014, Singapore
Objective 2: To establish monitoring programmes for ASP, AZA and BTX biotoxins in Member Countries for routine surveillance	Outcome 2: Establishment of monitoring programmes for ASP, AZA and BTX biotoxins in Member Countries for routine surveillance	Biotoxin monitoring surveys in Member Countries	Organization and conduct of one and half-year Biotoxins Monitoring Survey in 2015-2016. Extended to end of 2017.
Objective 3: To improve knowledge and understanding on ASP, AZA and BTX biotoxins occurrences and incidences in fish and shellfish in the ASEAN region and facilitate information exchange among Member Countries	Outcome 3: Improved knowledge and understanding on ASP, AZA and BTX biotoxins occurrences and incidences in fish and shellfish in the ASEAN region	Regional Technical Consultation	Organization and conduct of Regional Technical Consultation, 24-25 July 2013, Singapore
		Biotoxin monitoring surveys in Member Countries	Organization and conduct of one and half-year Biotoxins Monitoring Survey in 2015-2016. Extended to end of 2017.
		End-of-Project (EOP) Meeting	Organization and conduct of End-of-Project (EOP) Meeting. 14-15 Aug 2019
		Technical Compilation	Preparation and publication of Technical Compilation in 2019
Objective 4: To improve knowledge and understanding on toxic HAB occurrences and incidences in the ASEAN region	Outcome 4: Improved knowledge and understanding on toxic HAB occurrences and incidences in the ASEAN region	Regional Technical Consultation	Organization and conduct of Regional Technical Consultation in 3 rd qtr 2015
		End-of-Project (EOP) Meeting	Organization and conduct of End-of-Project (EOP) Meeting in 3 rd qtr 2019
		Technical Compilation	Preparation and publication of Technical Compilation in 2018/2019

Objective 5: To enhance regional capabilities for identification of toxic HAB species in Member Countries	Outcome 5: Enhanced capabilities for the identification of toxic HAB species in Member Countries	Regional Training Course on Identification of HAB Species in the ASEAN Region	Organization and conduct of Regional Training Course on Identification of HAB species in the ASEAN Region in 2 nd qtr 2016 (in collaboration with IOC-WESTPAC)
		Regional Training Course on Specimen Preservation and its Application in HAB Monitoring and Studies	Organization and conduct of Regional Training Course on Specimen Preservation and its Application in HAB Monitoring and Studies in 2 nd qtr 2017.
		Regional Training Course on Culturing for HAB Species Identification and Toxin Characterization	Organization and conduct of Regional Training Course on Culturing for HAB Species Identification and Toxin Characterization in 2 nd qtr 2018.

3.2 Overall Scope/Description of Project:

Activity	Description
Activity 1: Regional Technical Consultation on Biotoxins (ASP, AZA and BTX) Monitoring in the ASEAN region (2 days)	This Regional Technical Consultation will be held in the first year of the project in the 2 nd quarter of 2013. It will discuss and plan for all project activities, identify the training needs in the individual Member Countries, determine the content of the training course, identify the venue and expert trainers for the training course, identify the key project leaders and the targeted biotoxins for the surveys in Member Countries.
Activity 2: Regional Training Course in Biotoxins (ASP, AZA and BTX) Analyses (5 days)	The second year (2014) will involve a Regional Training Course with hands-on practical sessions on biotoxins analyses. The proposed biotoxins for training include Amnesic Shellfish Poisoning (ASP) toxin, Azaspiracids (AZA) and Brevetoxin (BTX). The training course is to be conducted by invited expert trainers. Two participants from each member country will be invited. It is envisaged that after the training course, Member Countries would be in a better position to upgrade their laboratory capabilities and credibility in the testing of ASP, AZA and BTX biotoxins in fish and fish products and to assist them in establishing biotoxins monitoring programmes in their own country.
Activity 3: Biotoxins Monitoring Survey (One and half-years) (Extended till end 2017)	After the training course, Member Countries are then encouraged to set up the methods learnt in the training course and use the methods for the survey. The survey will involve monitoring the biotoxins levels at identified site(s) over a period of one and half years at regular intervals during the third and fourth year (2015 and 2016) of the project.

	<p>Biotoxins that were already covered in the training course in 2010 (for example Diarrhetic Shellfish Poisoning, DSP and lipophilic toxins, TTX) can also be included in the survey if Member Countries are interested. The survey aims to improve Member Countries' understanding on the level of ASP, AZA and BTX biotoxins occurrences and incidences in fish and fisheries products in the ASEAN region. Due to the extension of the project till the end of 2019 and Member Countries' request, the survey period will be extended till the end of 2017.</p>
<p>Activity 4: Regional Technical Consultation on Biotxin-producing HAB species Identification (2 days)</p>	<p>A Regional Technical Consultation meeting (RTC) will be held in Singapore in 3rd quarter 2015 to initiate this component of the project and plan for all activities. All ASEAN-SEAFDEC Member Countries will be invited to the meeting and to participate in the activities. ASEAN-SEAFDEC Member Countries will present country reports on toxic HAB occurrences and incidences as well as the management of toxic HABs in their waters. A Key Project Leader (KPL) for each country will be appointed to be responsible for the project's activities in his or her country. The meeting will finalize the details of the training course to be conducted in 2016 and identify the necessary expert trainers and training needs in the region. The meeting will also initiate the process to establish a network or directory of responsible national authorities or HAB experts in the region.</p>
<p>Activity 5: Regional Training Course on Identification of HAB Species in the ASEAN Region (5 days)</p>	<p>This Regional Training Course will be conducted in Singapore in 2nd quarter 2016, in collaboration with IOC-WESTPAC. The training course will be conducted by invited expert trainers and it is envisaged that the methods for identifying toxic HAB species will be taught during the course. Two participants from each Member Country will be invited to attend this course. After the training course, Member Countries are recommended to apply what they have learnt to set up the appropriate methodologies in their own laboratories for identifying toxic HAB species.</p>
<p>Activity 6: Regional Training course on Specimen Preservation and its Application in HAB Monitoring and Studies (5days)</p>	<p>This Regional Training Course will be conducted in the 2nd quarter of 2017 in collaboration with the Institute of Ocean & Earth Science (IOES), University of Malaya (UM) at its Bachok Marine Research Station (BMRS) in Kelantan. The training course will include topics on specimen preservation methods and techniques, use of fluorescence and electron microscopy and flowcytometry. Two participants from each Member Country will be invited to attend this course. After the training course, Member Countries are recommended to apply what they have learnt to set up the appropriate methodologies in their own laboratories for monitoring of toxic HAB species.</p>
<p>Activity7: Regional Training course on Culturing for HAB Species Identification and Toxin Characterization (7 days)</p>	<p>This Regional Training Course will be conducted in the 2nd quarter of 2018, in collaboration with the Institute of Ocean & Earth Science (IOES), University of Malaya (UM) at its Bachok Marine Research Station (BMRS) in Kelantan. The training course will include topics on isolation, culturing and cell harvesting methods and techniques for morphology, molecular and toxin analysis of HAB species. Two participants from each member country will be invited to attend this course. After the training course, Member Countries are recommended to apply what they have learnt to set up the appropriate methodologies</p>

	in their own laboratories for identifying toxic HAB species.
Activity 8: Technical Compilation (10-12 months)	The Technical Compilation of the project will be prepared from 1st quarter of 2018 after biotoxin monitoring surveys in Member Countries have been completed and, results and reports submitted. It will be published in the project's final year in 2019. The Technical Compilation will comprise of the compilation of the biotoxins analytical methods and biotoxins monitoring survey reports of the Member Countries, the methodologies for the isolation, culturing, preservation, identification and monitoring of toxic HAB species from the three regional training courses, country reports on toxic HAB occurrences and incidences as well as the management of toxic HABs in Member Countries and, the list/directory of responsible national authorities and HAB experts in Member Countries.
Activity 9: End-of-Project (EOP) Meeting (2 days)	The End-of-Project (EOP) Meeting will be held in the 3 rd quarter of 2019. The EOP will present and discuss the reports and results of the biotoxins monitoring surveys conducted by Member Countries, country reports on HABs, discuss the challenges faced during the project implementation and plans for future projects or activities nationally and regionally, and finalize the Technical Compilation for publication.

3.3 Activity, Sub-activity and Proposed Budget for 2013-2019:

(Unit: USD)

Activity	Sub-Activity	Y1 2013	Y2 2014	Y3 2015	Y4 2016	Y5 2017	Y6 2018	Y7 2019
Activity 1: Regional Technical Consultation on Biotoxins (ASP, AZA and BTX) Monitoring in the ASEAN region	-	35,500	-	-	-	-	-	-
Activity 2: Regional Training Course in Biotoxins (ASP, AZA and BTX) Analyses	-	-	28,700	-	-	-	-	-
Activity 3: Biotoxins Monitoring Survey (to be extended till end 2017)	Sub-activity 3.1: Setting up of Biotoxins Analyses Methodologies	-	-	10,000	-	-	-	-
	Sub-activity 3.2: Implementation of Biotoxins Monitoring Survey	-	-	7,500	5,000	9,000	-	-

Activity 4: Regional Technical Consultation on Toxic HAB species Identification	-	-	-	31,700	-	-	-	-
Activity 5: Regional Training Course on Identification of HAB Species in the ASEAN Region	-	-	-	-	31,344	-	-	-
Activity 6: Regional Training Course on Specimen Preservation and its Application in HAB Monitoring and Studies		-	-	-	-	31,748	-	-
Activity 7: Regional Training Course on Culturing for HAB Species Identification and Toxin Characterization		-	-	-	-	-	42,572	-
Activity 8: Technical Compilation	-	-	-	-	-	-	2,000	3,000
Activity 9: End-of-Project (EOP) Meeting	-	-	-	-	-	-	-	36,850
Sub-Total		35,500	28,700	49,200	36,344	40,748	44,572	39,850

PART II: ACHIEVEMENT OF 2019 PROJECT IMPLEMENTATION

1. Achievements of the Project Implementation for the present year <2019>:

Technical Compilation

A total of 7 Member Countries, namely Indonesia, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam participated in the JTFVI Biotoxins Monitoring in the ASEAN region. However, it was noted that only Indonesia, Malaysia and Singapore managed to test for all 3 biotoxins (ASP, AZA and BTX).

The Technical Compilation contains the survey results from the participating countries, administrative reports and participants list for all the meetings and trainings, the methodology for the testing methods

shared during training, and information on Key Project Leader and National Reference Laboratory for both biotoxins monitoring and Harmful Algal Bloom monitoring.

End-of-Project (EOP) meeting

The EOP meeting was held on 14-15 Aug 2019. A total of 25 participants from 10 ASEAN Member Countries attended the EOP. The EOP presented and discussed reports and results of the biotoxins monitoring surveys conducted by Member Countries, discussed the challenges faced during the project implementation, finalized the Technical Compilation for publication.

2. Information of Present Year Activity including Involved Stakeholders:

List of Actual Sub-activity	Type of activity*	Number of Participants			Spent Budget (USD)
		MCs	SEAFDEC	Others	
Activity 8: Technical Compilation	Administrative	-	2 (1) MFRD		3000
Activity 9: End-of-Project (EOP) Meeting	Meeting	25 (14)	6 (5) MFRD	3	26,293.04

Remarks) Regarding the number of participants, please indicate total number of participants (and number of female participants within), such as 20 (10).

3. Achievements and Expected Outcome/Outputs of the Activity:

Planned activity	Expected outcome/output	Achievements
Activity 8: Technical Compilation	Preparation and publication of Technical Compilation in 2019	Technical compilation finalized during the EOP meeting in 14-15 Aug 2019. To be published by end of 2019 for distribution.
Activity 9: End-of-Project (EOP) Meeting	Organization and conduct of End-of-Project (EOP) Meeting. 14-15 Aug 2019	A total of 25 participants from 10 ASEAN Member Countries, 6 MFRD representatives and 3 experts attended the EOP meeting held on 14-15 Aug 2019. This project has successfully helped to enhance regional capabilities for the testing of ASP, AZA and BTX biotoxins as well as the identification of toxic HAB species. Member countries have a greater understanding and knowledge on the occurrences and incidences of biotoxins (i.e. fish and shellfish) and HAB species in the ASEAN region.

4. List of Completed Publications and Others (e.g. technical report, VDO, presentation file, etc.):

List of completed publications for the year 2019	Type of media	Attached e-file
Technical Compilation of Biotoxins Monitoring in the ASEAN Region	Hardcopy	

5. Evaluation from Participants of Member Countries for WS and Training Course (if available):

Planned activity	Evaluation/ Views from Participants
Activity 9: End-of-Project (EOP) Meeting	The participants from the SEAFDEC member countries expressed their heartfelt appreciation to MFRD for the warm hospitality accorded to them and the excellent arrangements made for the meeting and to the Government of Japan for making the meeting possible.

6. Major impacts/issues:

<i>Nil for Activity 8: Technical compilation and Activity 9: EOP Meeting</i>
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PART III: ACHIEVEMENTS IN OVERALL PROJECT DURATION

1. Abstract of Achievements in the Overall Project Duration:

<p>A total of 3 meetings (2 Technical Consultation and 1 EOP), 4 training courses (1 on biotoxin monitoring and 3 on HABs) and 1 technical compilation publication were developed. Over 100 participants from 10 ASEAN Member countries have benefitted from one or more of the activities mentioned.</p> <p>In conclusion, this project has successfully helped to enhance regional capabilities for the testing of ASP, AZA and BTX biotoxins as well as the identification of toxic HAB species. Member countries have a greater understanding and knowledge on the occurrences and incidences of biotoxins (i.e. fish and shellfish) and HAB species in the ASEAN region.</p>

2. Implemented Activities/sub-activities in the Overall Project Duration:

Activity	Description
Activity 1: Regional Technical Consultation on Biotoxins (ASP, AZA and BTX) Monitoring in the ASEAN region (2 days)	Organized and conducted Regional Technical Consultation, 24-25 July 2013, Singapore All project activities, training needs in the individual Member Countries, the content, venue and expert trainers of the training course, the key project leaders and the targeted biotoxins for the surveys in Member Countries were discussed and identified.
Activity 2: Regional Training Course in Biotoxins (ASP, AZA and BTX) Analyses (5 days)	Organized and conducted Regional Training Course in Biotoxins (AZA, ASP and BTX) Analyses, 2-6 June 2014, Singapore The Regional Training Course for AZA, ASP and BTX was conducted by invited experts with hands-on practical sessions on biotoxins analyses.
Activity 3: Biotoxins Monitoring Survey (One and half-years) (Extended till end 2017)	Organized and conducted one and half-year Biotoxins Monitoring Survey in 2015-2016. Extended to end of 2017. After the training course, Member Countries were encouraged to set up the methods learnt in the training course and use the methods for the survey. A total of 7 member countries participated in the survey.

<p>Activity 4: Regional Technical Consultation on Biotxin-producing HAB species Identification (2 days)</p>	<p>Organized and conducted Regional Technical Consultation, 5-6 Aug 2015</p> <p>ASEAN-SEAFDEC Member Countries presented the country reports on toxic HAB occurrences and incidences as well as the management of toxic HABs in their waters. The details of the training course to be conducted, the necessary expert trainers were identified, and training needs in the region was finalized at the meeting. A Key Project Leader (KPL) for each country was appointed to be responsible for the project's activities in his or her country. The meeting also initiated the process to establish a network or directory of responsible national authorities or HAB experts in the region.</p>
<p>Activity 5: Regional Training Course on Identification of HAB Species in the ASEAN Region (5 days)</p>	<p>Organized and conducted Regional Training Course on Identification of HAB Species in the ASEAN Region, 18 – 22 Jul 2016.</p> <p>This Regional Training Course was conducted in Singapore in collaboration with IOC-WESTPAC. The training course was conducted by invited expert trainers and the methods for identifying toxic HAB species was taught during the course.</p>
<p>Activity 6: Regional Training course on Specimen Preservation and its Application in HAB Monitoring and Studies (5days)</p>	<p>Organized and conducted Regional Training Course on Specimen Preservation and its Application in HAB Monitoring and Studies, 10 – 13 Jul 2017.</p> <p>This Regional Training Course was conducted in collaboration with the Institute of Ocean & Earth Science (IOES), University of Malaya (UM) at its Bachok Marine Research Station (BMRS) in Kelantan. The training course included topics on specimen preservation methods and techniques, use of fluorescence and electron microscopy and flowcytometry.</p>
<p>Activity7: Regional Training course on Culturing for HAB Species Identification and Toxin Characterization (7 days)</p>	<p>Organized and conducted Regional Training Course on Culturing for HAB Species Identification and Toxin Characterization, 8 – 15 Jul 2018.</p> <p>This Regional Training Course was conducted in collaboration with the Institute of Ocean & Earth Science (IOES), University of Malaya (UM) at its Bachok Marine Research Station (BMRS) in Kelantan. The training course included topics on isolation, culturing and cell harvesting methods and techniques for morphology, molecular and toxin analysis of HAB species.</p>
<p>Activity 8: Technical Compilation (10-12 months)</p>	<p>Preparation and publication of Technical Compilation in 2019</p> <p>The Technical Compilation of the project was prepared after biotoxin monitoring surveys in Member Countries have been completed and, results and reports submitted. It will be published in the project's final year in 2019. The Technical Compilation will comprise of the compilation of the biotoxins analytical methods and biotoxins monitoring survey reports of the Member Countries, the list/directory of responsible national authorities and HAB experts in Member Countries.</p>
<p>Activity 9: End-of-Project (EOP) Meeting</p>	<p>The EOP meeting was held on 14-15 Aug 2019. A total of 25 participants from 10 ASEAN Member Countries attended the EOP. The</p>

(2 days)	EOP presented and discussed reports and results of the biotoxins monitoring surveys conducted by Member Countries, discussed the challenges faced during the project implementation, finalized the Technical Compilation for publication.
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3. Achievements and Outcomes/Outputs of Activities in the Overall Project Duration:

List of Activities	Achievements and Outcomes/Outputs of Activities
Activity 1: Regional Technical Consultation on Biotoxins (ASP, AZA and BTX) Monitoring in the ASEAN region (2 days)	Organized and conducted Regional Technical Consultation, 24-25 July 2013, Singapore 21 participants from 10 ASEAN Member Countries, 1 Japanese Expert, and 9 participants from SEAFDEC (1 from Sec and 8 from MFRD) attended the meeting.
Activity 2: Regional Training Course in Biotoxins (ASP, AZA and BTX) Analyses (5 days)	Organized and conducted Regional Training Course in Biotoxins (AZA, ASP and BTX) Analyses, 2-6 June 2014, Singapore 24 participants from 10 ASEAN Member Countries, 2 Experts, and 4 participants from SEAFDEC MFRD attended the training.
Activity 3: Biotoxins Monitoring Survey (One and half-years) (Extended till end 2017)	Organized and conducted one and half-year Biotoxins Monitoring Survey in 2015-2016. Extended to end of 2017. A total of 7 member countries participated in the survey.
Activity 4: Regional Technical Consultation on Biotoxin-producing HAB species Identification (2 days)	Organized and conducted Regional Technical Consultation, 5-6 Aug 2015 23 participants from 10 ASEAN Member Countries, 3 Japanese Experts, and 9 participants from SEAFDEC MFRD attended the meeting.
Activity 5: Regional Training Course on Identification of HAB Species in the ASEAN Region (5 days)	Organized and conducted Regional Training Course on Identification of HAB Species in the ASEAN Region, 18 – 22 Jul 2016. 21 participants from 10 ASEAN Member Countries, 6 Experts, and 4 participants from SEAFDEC MFRD attended the training.
Activity 6: Regional Training course on Specimen Preservation and its Application in HAB Monitoring and Studies (5days)	Organized and conducted Regional Training Course on Specimen Preservation and its Application in HAB Monitoring and Studies, 10 – 13 Jul 2017. 20 participants from 10 ASEAN Member Countries, 4 Experts, and 2 participants from SEAFDEC MFRD attended the training.
Activity 7: Regional Training course on Culturing for HAB Species Identification and Toxin Characterization (7 days)	Organized and conducted Regional Training Course on Culturing for HAB Species Identification and Toxin Characterization, 8 – 15 Jul 2018. 20 participants from 10 ASEAN Member Countries, 4 Experts, and 2 participants from SEAFDEC MFRD attended the training.
Activity 8: Technical Compilation (10-12 months)	Preparation and publication of Technical Compilation in 2019 The Technical Compilation of the project was finalized at the EOP meeting. It will be published in the project's final year in 2019.

Activity 9: End-of-Project (EOP) Meeting (2 days)	The EOP meeting was held on 14-15 Aug 2019. A total of 25 participants from 10 ASEAN Member Countries, 3 Experts, 6 attended the EOP meeting.
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4. Evaluation and Major Impacts/Issues in the Overall Project Duration:

Limited funding for sampling and analysis and insufficient laboratory resources were the most common issues faced by the member countries during the survey. The resulted in some delay in the survey which were resolved through the extension of the survey monitoring phase for the project.

5. Publications and Others (e.g. technical report, VDO, presentation file, etc.):

Publication	Year/issue	Title of publication
SEAFDEC Newsletter	Vol. 36 No.3 (Jul-Sep 2013)	Regional Technical Consultation (RTC) Meeting of the Japanese Trust Fund VI Project on Chemical & Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins Monitoring in ASEAN Region: ASP, AZA and BTX
Annual Highlights	2013	Japanese Trust Fund VI: Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins Monitoring in Fish and Fish Products in ASEAN Region: ASP, AZA and BTX
SEAFDEC Newsletter	Vol.37 No.2 (Apr-Jun 2014)	Regional Training Course in Biotoxins Analysis: ASP, AZA and BTX
Annual Highlights	2014	Japanese Trust Fund VI: Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins Monitoring in Fish and Fish Products in ASEAN Region: ASP, AZA and BTX
SEAFDEC Newsletter	Vol.38 No.3 (Jul-Sep 2015)	Regional Technical Consultation on Harmful Algal Blooms in the ASEAN Region
Annual Highlights	2015	Japanese Trust Fund VI: Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins Monitoring (ASP, AZA and BTX) and HABs in the ASEAN Region
SEAFDEC Newsletter	Vol.39 No.3 (Jul-Sep 2016)	Regional Training Course on Identification of HAB Species in the ASEAN Region
Annual Highlights	2016	Japanese Trust Fund VI: Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins (ASP, AZA and BTX) and HABs in the ASEAN Region
Fish for the People	Vol.15 No.1:2017	Monitoring and Identification of Harmful Algal Blooms in Southeast Asia to support SDG 14.1
SEAFDEC Newsletter	Vol.40 No.3 (Jul-Sep 2017)	Regional Training Course on Specimen Preservation and its Application in Harmful Algal Bloom (HAB) Monitoring Studies
Annual Highlights	2017	Japanese Trust Fund VI: Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins (ASP, AZA and BTX) and HABs in the ASEAN Region
SEAFDEC Newsletter	Vol.4 No.3 (Jul-Sep 2018)	Regional Training Course on Culturing of HAB Species and Toxin Characterization
Annual Highlights	2018	Japanese Trust Fund VI: Chemical and Drug Residues in Fish and Fish Products in Southeast Asia – Biotoxins (ASP, AZA and BTX) and HABs in the ASEAN Region

