World Organisation for Animal Health

SEACFMD Bulletin

Foot and Mouth Disease Situation
January to December 2024

WOAH SUB-REGIONAL REPRESENTATION FOR SOUTH-EAST ASIA (SRR-SEA)
C/o Department of Livestock Development, Phaya Thai 10400, Bangkok, Thailand
Tel.: (+66-2) 6534864 * Fax (+66-2) 6534904 Email: srr.seasia@woah.org

Table of Contents

Summary

1) The present issue summarises the Foot-and-mouth disease (FMD) outbreaks in the SEACFMD region and the characterization of detected FMD viruses (FMDVs).
2) In total, 248 FMD outbreaks were reported in the SEACFMD region of which 111 outbreaks were reported in Indonesia and remaining 137 FMD outbreaks were reported in Cambodia, China, Malaysia, Myanmar, Thailand, and Vietnam.
3) While the FMDV type involved in Indonesia outbreaks was identified as Serotype O, only 57 out of 137 outbreaks in other affected countries were typed and identified as serotype O.
4) None of the SEACFMD Members reported occurrence of FMDV Serotype A in 2024. Serotype Asia-1 was not reported since 2017 in the Region.
5) FMD outbreaks has not been reported in Lao PDR and Mongolia.
6) Affected countries (except Indonesia) reported that samples were not collected or typed for 60% (79 out of 137) of the reported FMD outbreaks.
7) ***O/ME-SA/Ind-2001e*** strain is still dominant in the region.
8) ***Serotype A*** was not reported in Malaysia or Thailand, despite cases being recorded the previous year in these countries.
9) The highest number of outbreaks was observed in January and February 2024, while a notable number of cases were also reported from the In December.
10) ***Brunei, the Philippines, and Singapore*** have maintained their official status of FMD free without vaccination.
11) FMD outbreak data and lineage-specific information from 2015 to 2023 were analysed and published in collaboration with Chiang Mai University, Thailand

Introduction

1. Aims

Following the previous editions of the SEACFMD Bulletin, which reported on the regional foot-and-mouth disease (FMD) situation from 2015 to 2023, the current issue provides a comprehensive summary of the FMD status across the SEACFMD region for the entire year of 2024. This SEACFMD region includes the 10 ASEAN Member States, as well as China and Mongolia.

The SEACFMD Bulletins are designed to provide regular updates to Member countries, partners, and stakeholders on the evolving FMD landscape within the region. By disseminating timely and accurate information, these bulletins aim to support the development and refinement of risk-based strategies, and to promote more effective and coordinated approaches to FMD control and prevention. Through shared knowledge and collaborations, the SEACFMD campaign continues to strengthen regional capacity in disease surveillance, response, and long-term eradication efforts.

2. Reporting period

January 1st - December 31st, 2024

3. Data source

Sources of information in this report include data submitted by members to WOAH through the World Animal Health Information System (WAHIS) and submissions by Member Countries' Veterinary Services via email. The ASEAN Regional Animal Health Information System (ARAHIS) was decommissioned by December 2024. In addition, reports from the WOAH FMD Reference Laboratories in Pirbright (WRLFMD) 2023-2024 and country reports from the 27th SEACFMD Sub Commission meeting in September 2025 in Bangkok, Thailand, were considered.

An FMD outbreak is defined as the occurrence of FMD in one or more animals in an epidemiological unit (a commune in Vietnam, a sub-district in Cambodia, a district in Indonesia or village/farm in the other SEACFMD countries).

4. Data analysis

The descriptive analysis was based on official reports and country presentations provided by SEACFMD Members during the period. MS Excel was used for organising and cleaning the datasets. The spatial and temporal distribution of FMD cases across the region was analysed, with heatmaps created to visually represent patterns and trends. These visualisations were generated using QGIS, complemented by Power BI for interactive data exploration and SaTScan for statistical analysis of disease clusters.

The FMD information based on the available data has been regularly updated on the SEACFMD dashboard on the WOAH regional website (South-East Asia, China and Mongolia Foot and Mouth Disease (SEACFMD) Campaign WOAH - Asia).

Outbreaks of FMD in SEACFMD Countries in 2024

1. Overview of the regional situation in 2024

In 2024, FMD outbreaks continued to affect traditionally endemic countries, including Cambodia, China, Peninsular Malaysia, Myanmar, Indonesia, Thailand, and Vietnam. In contrast, Lao PDR and Mongolia did not report any new outbreaks (Figure 1).

The total number of reported FMD outbreaks in 2024 was 248, which is comparable to the previous year (202 outbreaks in 2023). However, this figure may not fully represent the actual FMD situation due to underreporting, a low proportion of outbreaks being investigated, and limited virus subtyping.

A total of 137 outbreaks were reported across Cambodia, China, Malaysia, Myanmar, Thailand, and Vietnam. Indonesia, meanwhile, reported 111 outbreaks, accounting for the majority among member countries. Notably, 10 distinct clusters were identified in Indonesia (Figures 2 and 3).

Of the 137 outbreaks (excluding Indonesia), 57 were attributed to serotype O. The remaining outbreaks were untyped, primarily due to the absence of samples, insufficient sample quantity, or delays in laboratory testing. All outbreaks reported in Indonesia were confirmed as caused by serotype O, with samples verified by WRLFMD.

Samples from Indonesia sent to WRLFMD were identified as the predominant lineage O/ME-SA/Ind-2001e.

The highest number of outbreaks was observed in January and February 2024, with additional clustering of cases reported in December. (Figures 4 and 5).

Cattle and buffaloes were affected in 231 outbreaks. Infections involving pigs and small ruminants (sheep/goats) were reported less frequently and were mainly observed in Malaysia, Indonesia, Vietnam, and China.

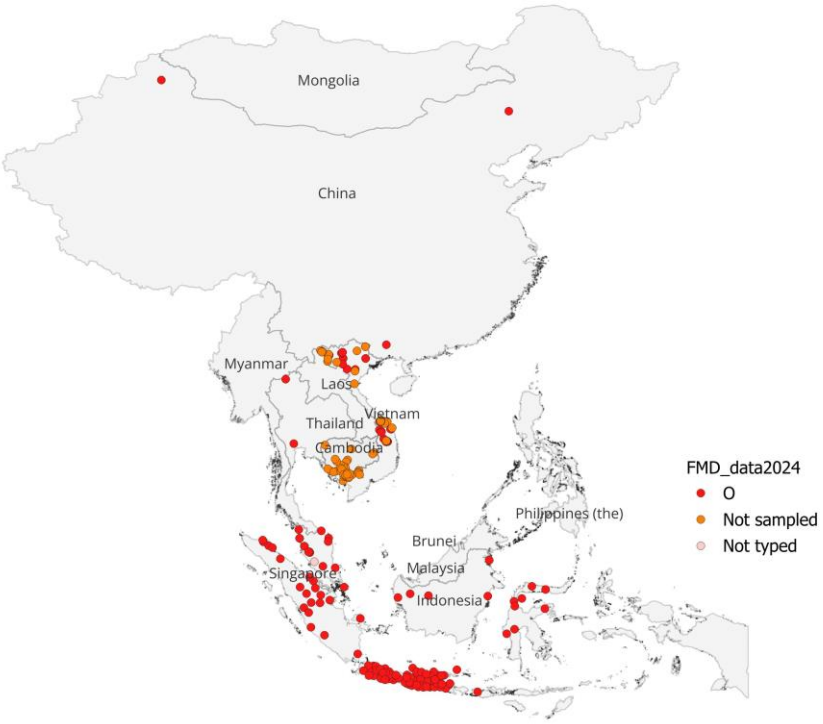


Figure 1. Distribution of FMD outbreaks in SEACFMD countries, 2024 (QGIS)

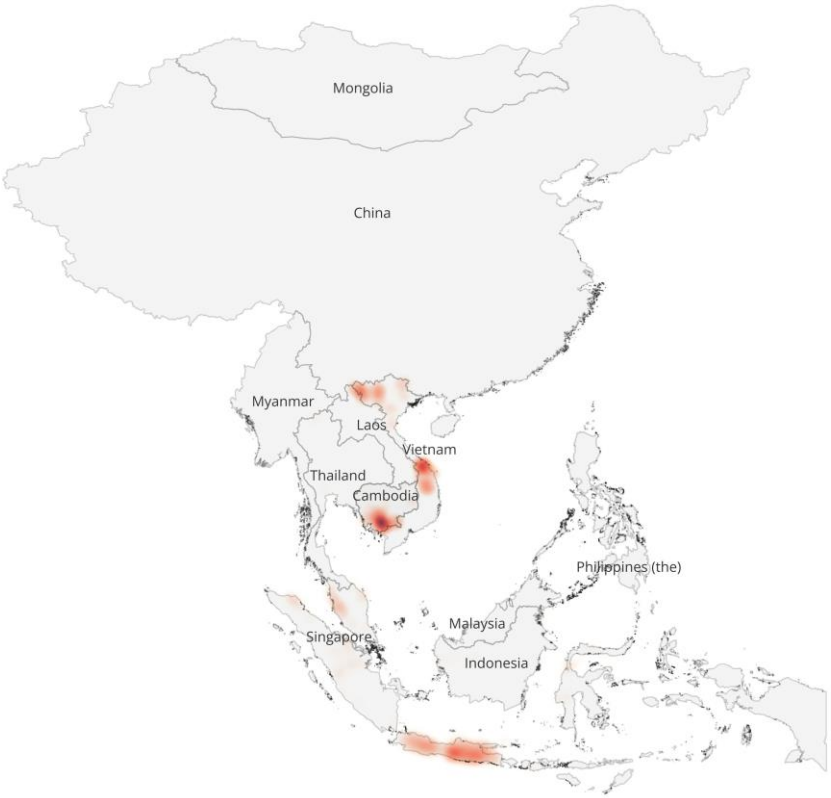


Figure 2. FMD heatmap in SEACFMD countries, 2024 (QGIS)

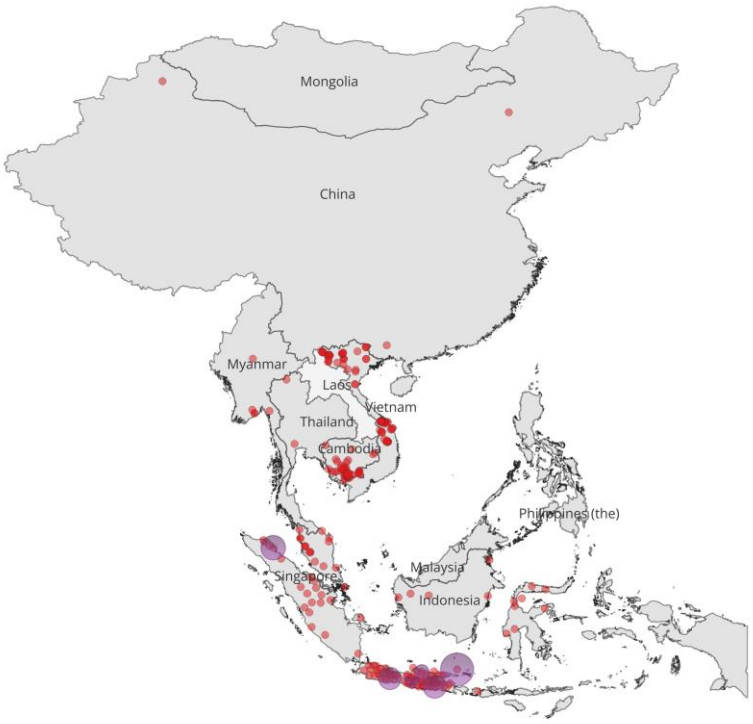


Figure 3: FMD clusters detected in SEACMD countries, 2024 (SatScan)

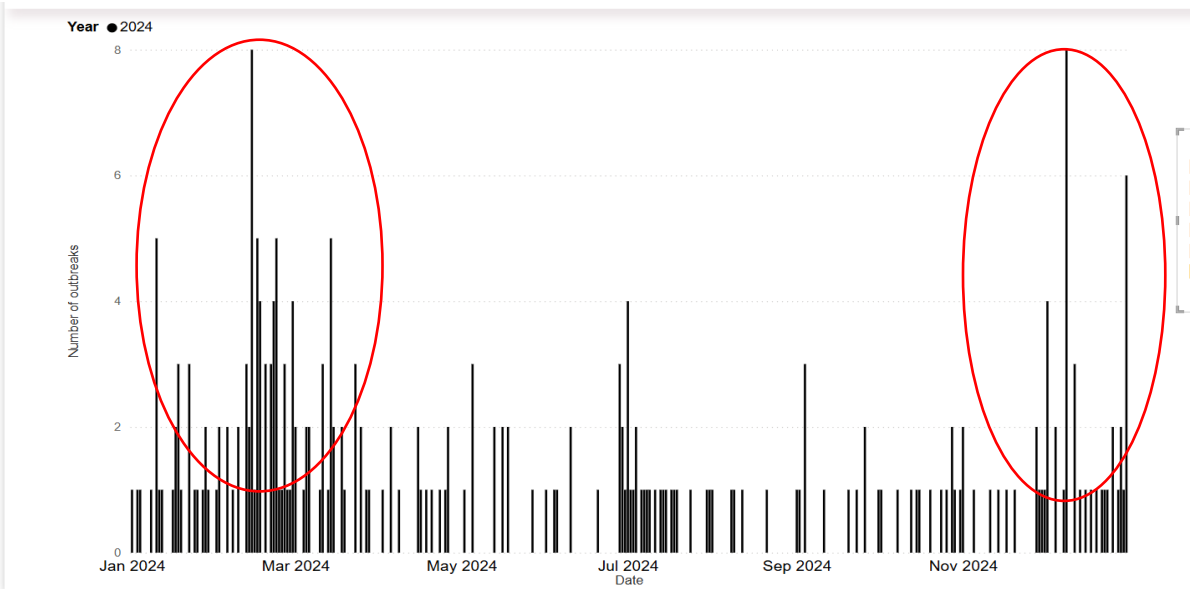


Figure 4 Temporal distribution of FMD outbreaks in SEACFMD countries 2024

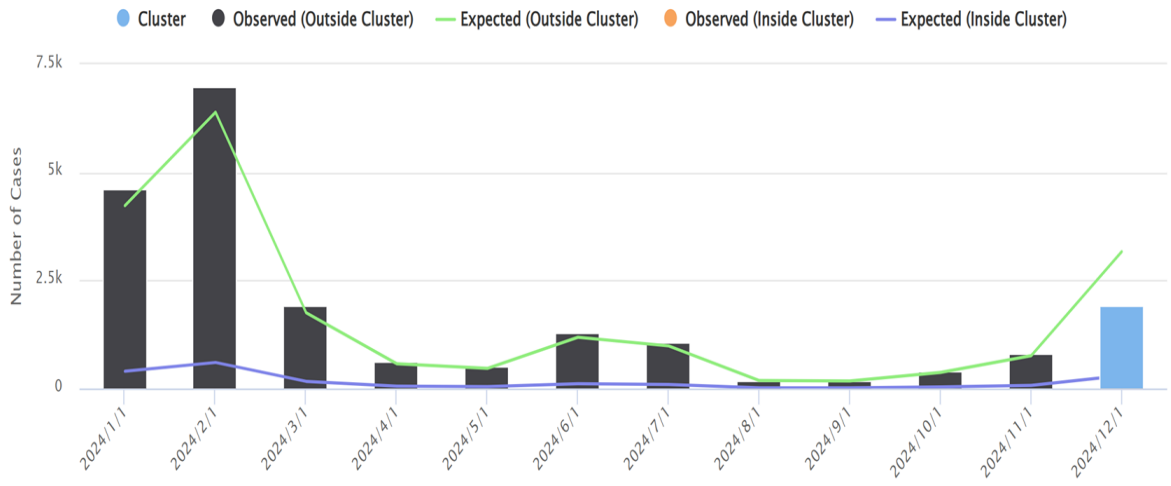
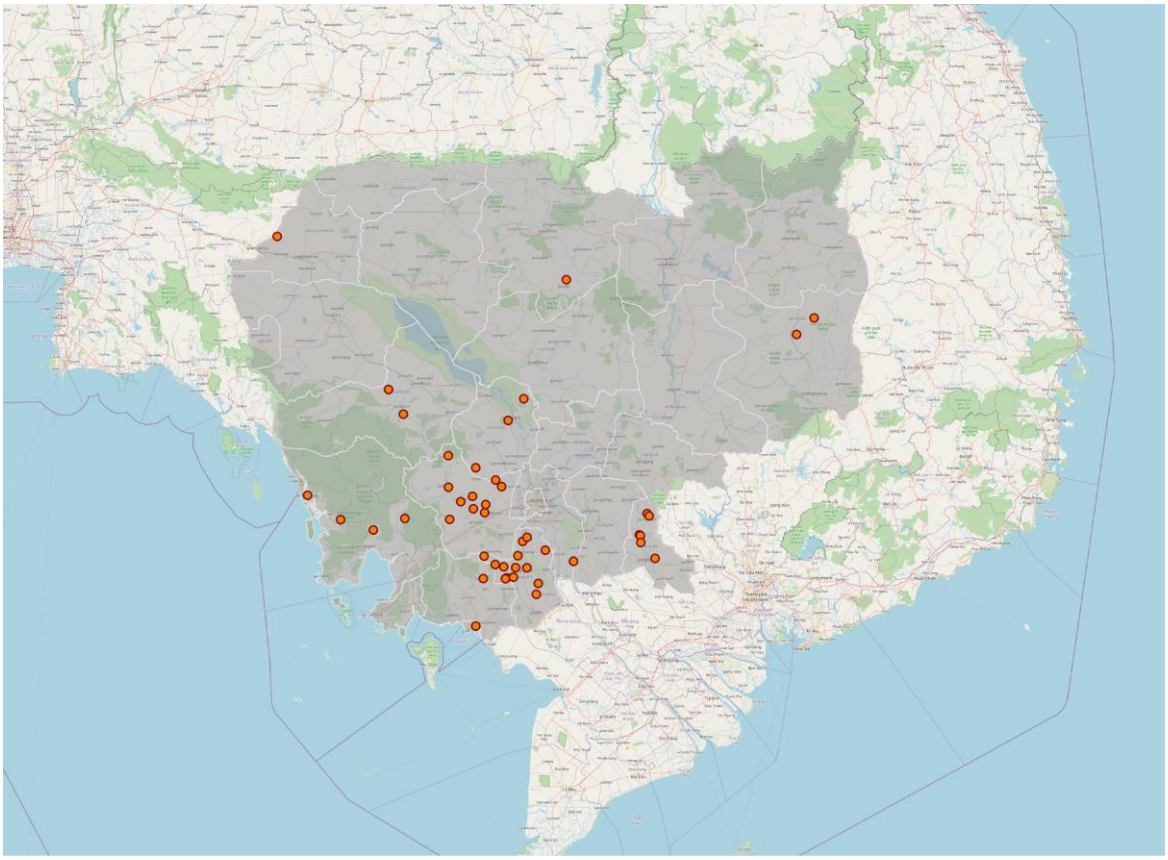


Figure 5 Temporal analysis of FMD outbreaks in SEACFMD countries 2024 (SatScan)

2. FMD situation in SEACFMD countries

Cambodia

Cambodia reported 46 FMD outbreaks across the country in 2024[1] throughout the year. The FMD occurrence was stable in comparison to the previous year. Affected animal species included cattle and buffaloes. The diagnosis was based on clinical signs, and no samples were collected for further subtyping.



[1] Country report

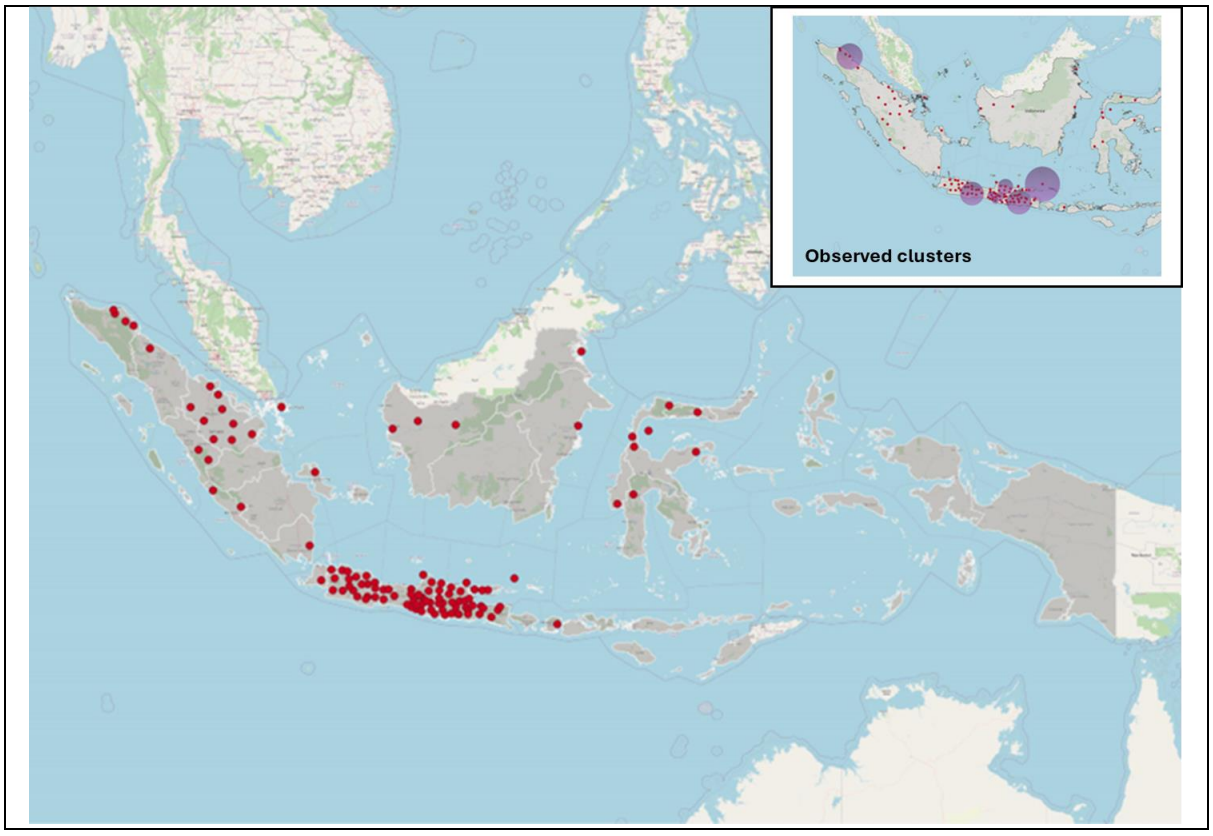
China

In 2024, China reported three FMD outbreak from Nei Mongol, Guanxi and Xinjiang Uygur provinces[2]. The outbreak was caused by O serotype, affecting cattle and pigs.

[2] Data from WAHIS

Indonesia

Indonesia was free from FMD for more than 30 years, with the last case reported in 1986. However, a new FMD incursion was detected in April 2022, with outbreaks identified simultaneously in East Java and Aceh provinces. Since then, the disease has spread to other provinces and islands. In 2024, FMD infection continued, with 111[3] outbreaks reported across 21 provinces. 10 clusters were observed in Indonesia. WRLFMD identified that the outbreak was caused by O/ME-SA/Ind-2001e [4] https://www.wrlfmd.org/east-and-southeast-asia/indonesia



[3] Data submitted by country
[4] WRLFMD country report 2023-2024

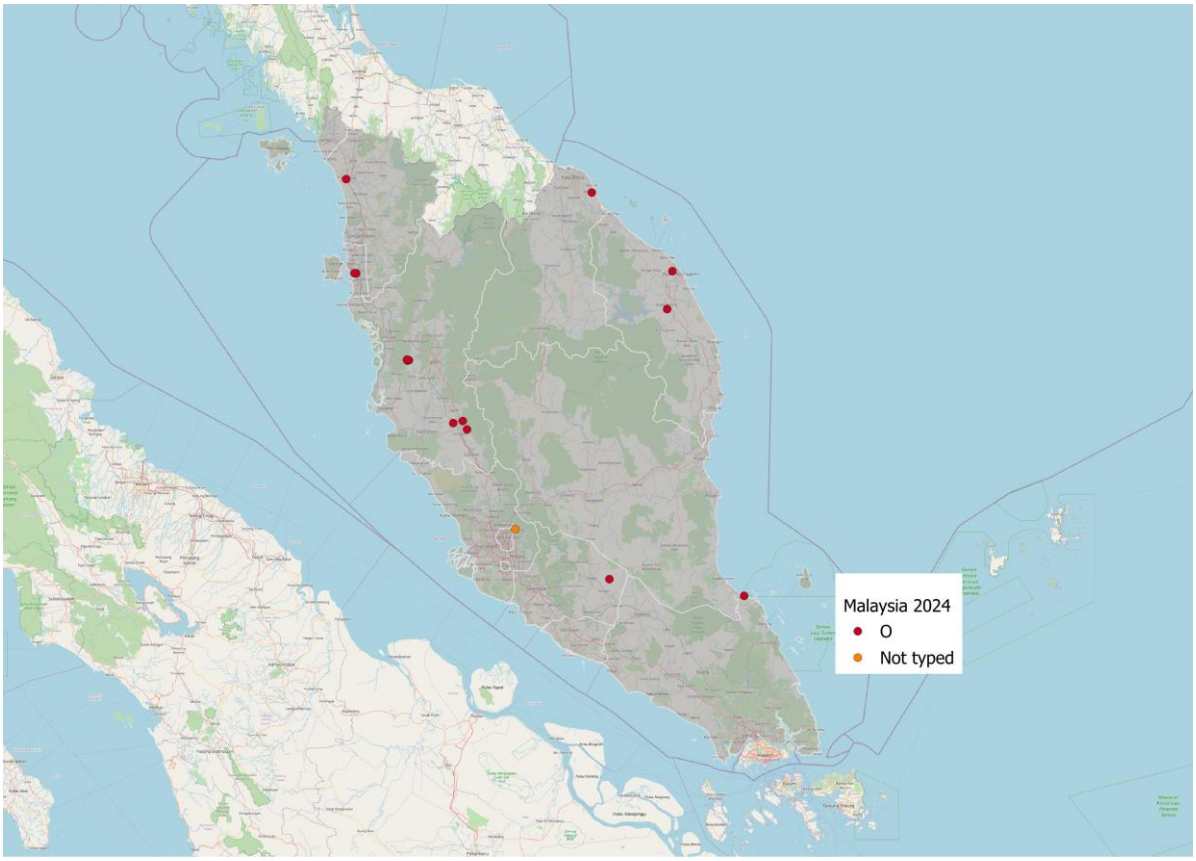
Lao PDR

Lao PDR did not report any FMD outbreaks in 2024.

Malaysia

Malaysia reported 15 FMD outbreaks across the Peninsular region, most of which affected cattle, with a single case involving pigs. Fourteen outbreaks were identified as serotype O, while one case remained uncharacterised.

The States of Sabah and Sarawak have maintained the FMD-free status without vaccination.

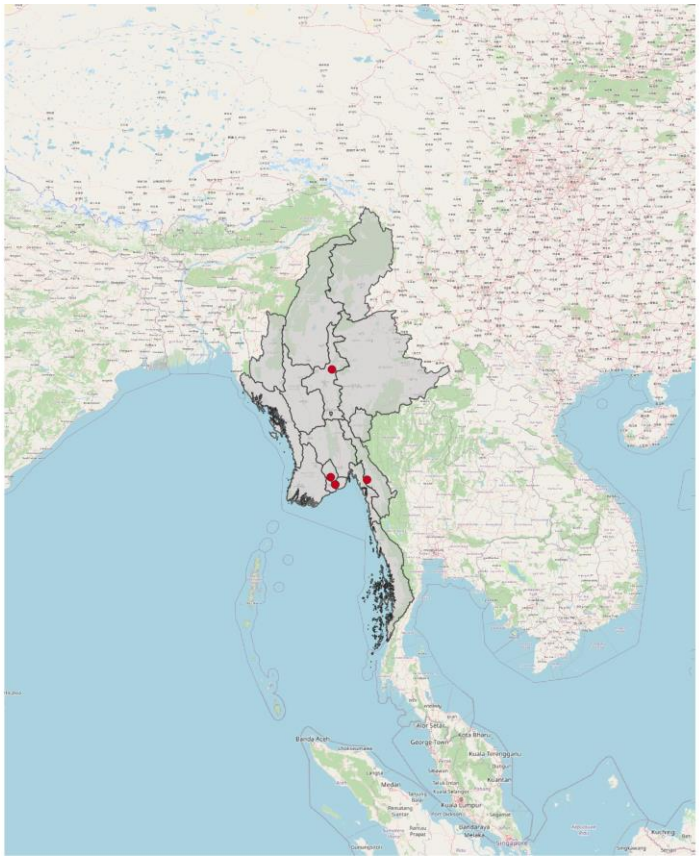


Mongolia

Mongolia did not report any FMD outbreaks in 2024.

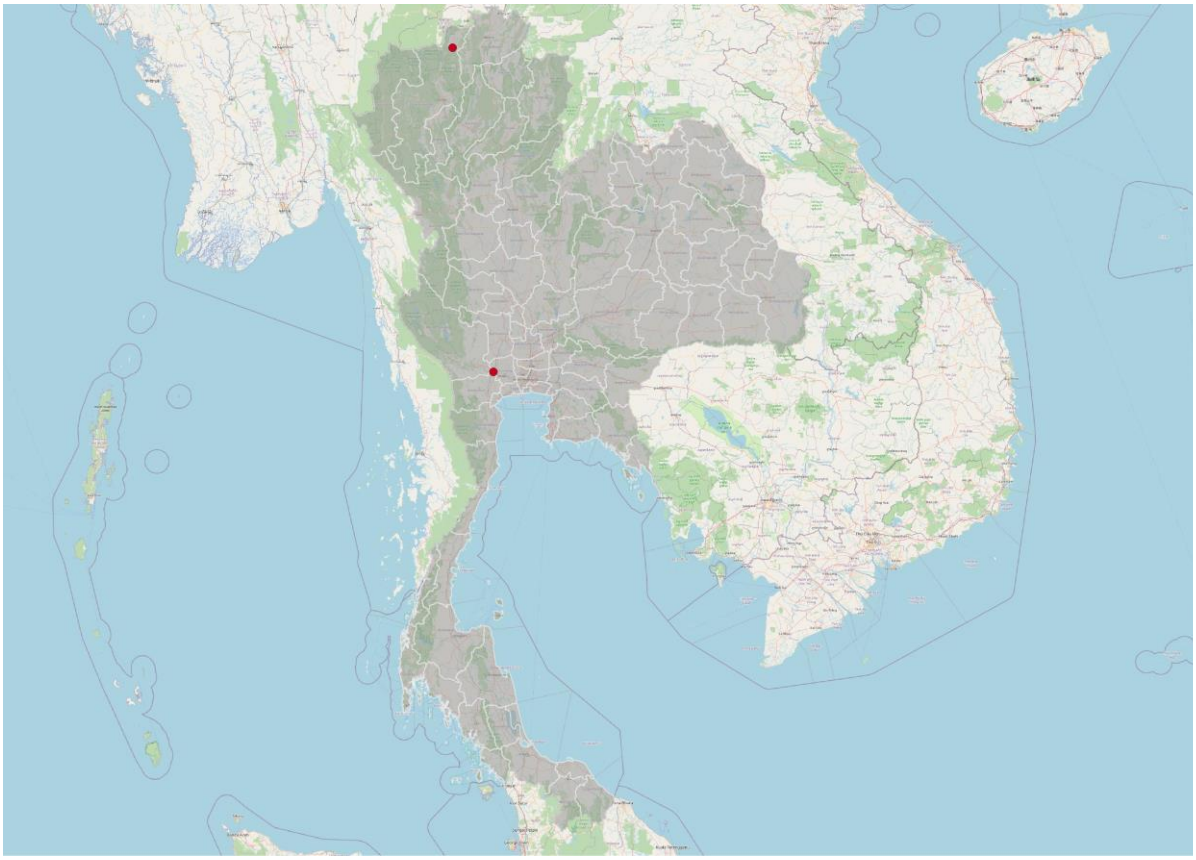
Myanmar

Myanmar has reported 5 outbreaks in 1 state (Kayin State) and 2 regions (Yangon and Mandalay Regions), caused by serotype O. The outbreaks involved cattle, goats, and pigs.



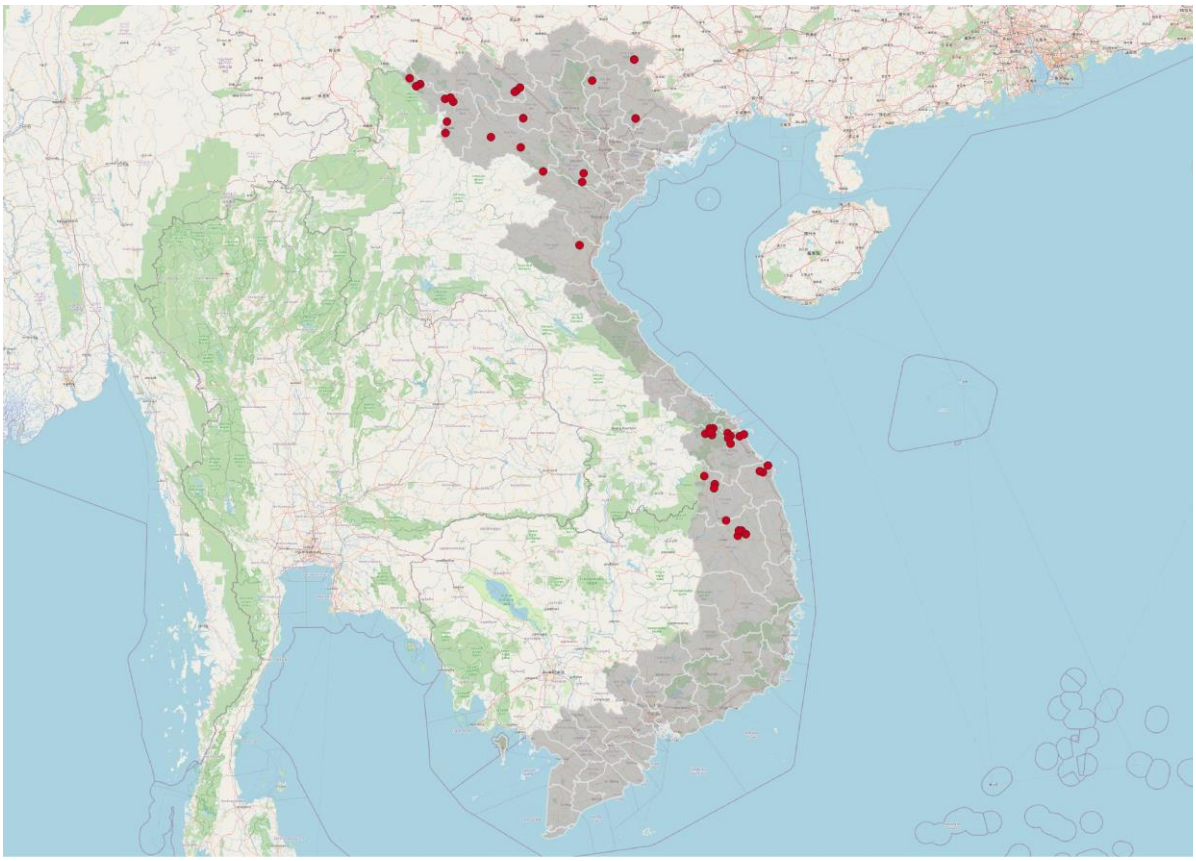
Thailand

In 2024, Thailand reported just two FMD outbreaks across the country, affecting cattle and buffalo. This marks a significant decrease compared to 110 outbreaks in 2022 and 16 cases in 2023. All cases were attributed to Serotype O.



Vietnam

Vietnam reported 66 FMD outbreaks in the northern and southern regions of the country. The outbreaks involved cattle, buffaloes, and a few pigs. Most of the outbreaks were identified as serotype O based on clinical signs, and no information is currently available regarding the characterization of the FMDV.



Characterisation of FMDVs in SEACFMD Countries in 2022-2024

In 2022-2024, the following FMDV strains were detected:

- Serotype O: O/ME-SA/Ind-2001e
- Serotype O: O/ME-SA/PanAsia
- Serotype O: O/CATHAY
- Serotype A: ASIA/SEA-97

Table 1. FMDV strains detected in SEACFMD Member Countries in 2022-2024.

Year	Country	Serotype O	Topotype O				Serotype A
			SEA/ Mya-98	ME-SA/ PanAsia	ME-SA/ Ind-2001	Cathay	ASIA/ Sea-97
2022	Cambodia						
	China	+				+*	
	Indonesia	+			+		
	Lao PDR[a]						
	Myanmar						
	Malaysia	+			+		
	Mongolia	+			+		
	Thailand	+			+		+
	Viet Nam	+*					
2023	Cambodia						
	China	+			+*		
	Indonesia	+			+*		
	Lao PDR[a]						
	Myanmar						
	Malaysia	+		+			+*
	Mongolia						
	Thailand	+			+		
	Viet Nam	+*					
2024	Cambodia	+					
	China	+					
	Indonesia	+			+		
	Malaysia	+			+*		
	Myanmar	+					
	Thailand	+					

+: the FMDV lineage present in the country.
** Information extracted from country reports*
Note: data were based on the genotyping reports of the World Reference Laboratory for FMD (WRL) http://www.wrlfmd.org/country-reports and country reports presented at the SEACFMD Sub Commission Meeting in September 2024.

FMDV O/ME-SA/Ind-2001e has been confirmed in the samples sent to WRLFMD from Indonesia.

Serotype A was not reported in Thailand or Malaysia, where it had been detected in previous years.

None of the SEACFMD Members have reported serotype Asia-1 since its last detection in the Rakhine state of Myanmar in 2017.

FMD related activities

1. SEACFMD Governance Meetings

The Upper Mekong Working Group (UMWG) on FMD Zoning and Animal Movement Management held its first in-person meeting since the COVID-19 pandemic in April 2024, in Luang Namtha, Lao PDR. This meeting was focused on updating on FMD situation and trade facilitation measures for animals and animal products among Upper Mekong countries, in line with bilateral agreements and using WOAH standards as a reference to promote safer cross-border trade. Participants reviewed animal movement risk mapping, noting that trade routes and movement patterns have changed significantly since the pandemic due to shifts in market demand, policy, and pricing. Considering these changes, the group highlighted the urgent need for a comprehensive, updated study on animal movement risk pathways in Greater Mekong Subregion. The most recent assessment was conducted in 2015; and a new study would provide crucial insights to guide disease control efforts and support safe, sustainable trade practices that protect both animal health and the livelihoods of communities engaged in the trade. The detail of the meeting including the presentations are available here.

The 27th SEACFMD Sub-Commission meeting convened in Bangkok, Thailand from 3 to 6 September 2024, bringing together 79 participants, including eight virtual attendees. Delegates included representatives from 12 SEACFMD Members, non-member nations, as well as partners such as donors, reference laboratories, collaborating centres, research institutions, universities, and the private sector including vaccine manufacturers and livestock industries. The meeting reviewed the current global and regional FMD situation, examined regional challenges, and facilitated the exchange of experiences from implementing the SEACFMD Roadmap. It also sought to identify practical solutions for closing critical gaps in FMD control, set future directions for the SEACFMD campaign, and elected new leadership for the Sub-Commission. A significant focus of the meeting was a forward-looking (Foresight) exercise that encouraged participants to envision the state of FMD control in the SEACFMD region by 2050.

2. Field studies and research

The **FMDV Asia 1 study** was conducted in collaboration with Massey University and aimed to evaluate whether the absence of reported foot-and-mouth disease virus (FMDV) serotype Asia 1 cases in Southeast Asia (SEA) since 2017 indicates true regional freedom or reflects inadequate surveillance. Using scenario tree models, the study assessed the sensitivity of passive surveillance systems in various countries, based on assumed incidence rates and expert input. The findings suggest that Asia 1 likely has not circulated at detectable levels, due to a combination of low surveillance sensitivity, infrequent introductions, and the inability of past strains to establish. While sporadic, undetected outbreaks may have occurred, they likely remained below detection thresholds.

Epidemiological characteristics of FMD outbreaks - The FMD dataset from 2015 to 2023 was cleaned and validated using multiple sources, including the SRR SEA archive, country reports presented during SEACFMD Governance meetings, and the SEACFMD bulletin, in collaboration with Chiang Mai University, Thailand. Further analysis was conducted on the epidemiological characteristics, temporal changepoints, and space-time clusters of FMD outbreaks in SEACFMD member countries. The changepoint analysis revealed significant fluctuations in outbreak trends, highlighting the dynamic nature of FMD activity in the region. Periods of increased outbreak frequency were followed by phases of decline, suggesting shifts in transmission patterns over time. A sharp peak occurred in 2020, followed by a notable decline in early 2021 and a gradual decrease through early 2023. Although a slight uptick in outbreaks was observed in early 2023, it was followed by a marked decline toward the end of the year.

Animal price monitoring study - A pilot study conducted in collaboration with Chiang Mai University in Thailand used publicly available data to investigate correlations between animal prices, animal movement, and Foot-and-Mouth Disease (FMD) outbreaks or incursions. The study found a strong correlation between cattle prices and FMD outbreaks, with price increases predicting a rise in outbreaks one to two months later. Both live cattle and carcass prices were effective in forecasting FMD outbreaks, indicating that can serve as a useful indicator. Additionally, animal movement data revealed a 4 to 7-month lag between FMD outbreaks and subsequent increases in reported cattle movements. However, no significant cross-correlation was found between animal prices and the number of FMD-affected cattle.

The manuscripts titled 'Probability of Freedom from Foot-and-Mouth Disease Virus Serotype Asia 1 in Southeast Asia, China, and Mongolia' (Massey University); 'Epidemiological Characteristics, Temporal Change Points, and Space-Time Clusters of Foot and Mouth Disease Outbreaks in SEACFMD Member Countries: Insights into Outbreak Dynamics to Support Long-Term Eradication Efforts through the SEACFMD Campaign'; and 'Using Online Public Animal Price Data as Signals for Predicting an Increase in Animal Disease Outbreak Reports: A Pilot Study on Cross-Correlation Modeling in Thailand' (Chiang Mai University) have been submitted to the peer-reviewed scientific journals.

3. ARAHIS/WAHIS Integration Project

ARAHIS (ASEAN Regional Animal Health Information System) served as a platform for reporting and sharing animal disease information among ASEAN member countries since its launch in 2016. Over the years, it played a key role in supporting regional disease monitoring efforts, particularly for FMD. However, due to outdated infrastructure and repeated failures in data reporting, the system was officially decommissioned in December 2024. To ensure the continuity of disease data sharing, the WOAH SRR-SEA, in collaboration with the WOAH WAHIAD team and Singapore—the ASEAN lead country for ARAHIS, initiated a project to integrate ARAHIS reporting into the WAHIS Early Warning Module. The pilot phase of this integration began in January 2025.

During the pilot period, three ASEAN countries have successfully reported priority animal diseases using the WAHIS Early warning module. This marks an important step toward streamlining regional disease reporting and enhancing early warning capabilities. Continued monitoring, technical

support, and training are planned to ensure smooth adoption and effective use of this module across all ASEAN Member States.

Conclusions and discussions

In 2024, a total of 248 FMD outbreaks were reported in the SEACFMD region, which remained stable with outbreaks in 2023. Serotype O remained the dominant serotype, with the Ind-2001 strain (e sub-lineage) being the most prevailing genotype.

This report was based on the FMD reports submitted by SEACFMD Members through WAHIS, and country presentations during the 27th SEACFMD Sub Commission meeting in September 2024. The under reporting of FMD outbreaks remains still a crucial issue because of which we may not get the true epidemiological pattern of the FMD situation in the region. Besides high percentage of the reported outbreaks that were not subjected to virus characterisation/ typed due to the absence of/insufficient samples collected or delayed laboratory testing is biggest challenge to get true estimate of circulating FMD virus serotypes.

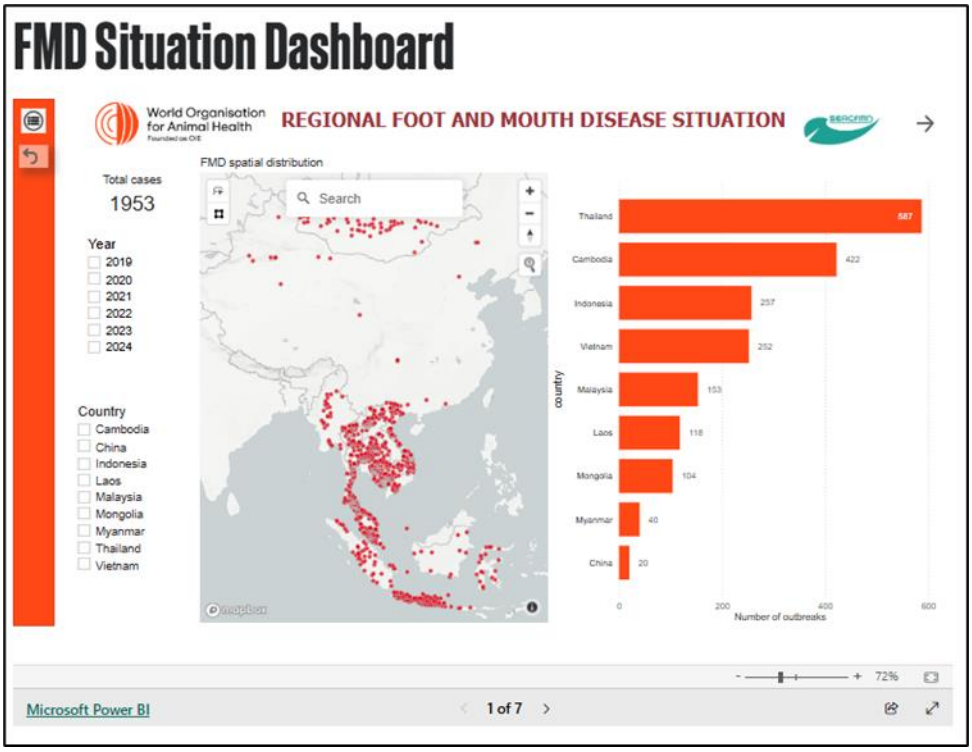
Only Indonesia submitted samples to the WRLFMD in 2024, highlighting the critical need to facilitate sample submissions to the reference laboratory for further investigation and a better understanding of FMDV circulation in the region, as well as to capture more accurate epidemiological patterns.

The FMDV Asia 1 study revealed that the sensitivity of the surveillance system for detecting FMDV, particularly at low frequencies, in member countries was weak. The findings emphasise the need for further research to refine parameters and gain a better understanding of the dynamics of FMDV introduction risks. Overall, the study underscores the importance of strengthening surveillance efforts to effectively manage and mitigate the risks associated with FMD in the region

Therefore, it is recommended to train veterinarians from member countries on outbreak investigation, surveillance strategy, sampling, and reporting of FMD outbreaks. Additionally, support should be provided to enhance laboratory diagnostic capabilities for further characterisation of FMDV.

Brunei, the Philippines, and Singapore have maintained their official status of FMD free status and FMD free zones in Malaysia (Sabah and Sarawak) without vaccination. Members should continue to focus on measures to prevent the incursion of FMD in free countries and zones. Emergency preparedness, contingency planning and early warning in place are some of the key strategies to mitigate the risk of incursion.

The ARAHIS/WAHIS Integration Project has made good progress through active collaboration between WOAH and ASEAN Member States to synchronise both reporting systems. The pilot project started in January 2025 had 3 ASEAN Member States reporting their disease status using Early warning module of WAHIS so far.



* Guidance for navigating the SEACFMD dashboard

Based on the data from 2019 to 2024, SRR SEA has updated a dynamic SEACFMD dashboard that allows us to inform outbreaks in a timely manner and share experience among members in emerging situations. This Dashboard has been published on the WOAH Regional website and being updated regularly.

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WOAH Sub-Regional Representation for South-East Asia
c/o DLD, 69/1 Phayathai Road, Rachathewi, 10400 Bangkok, THAILAND
tel (+662) 653-4864 ; fax (+662) 653-4904 ; srr.seasia@wah.org