

Submarine Acquisition in Southeast Asia: The Dangers

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Abstract The acquisition of submarines is not only intrinsically difficult and expensive for small and medium navies, but their maintenance and operation pose real challenges for them too. In particular, their operation in such contested and demanding waters as the South China Sea in an era of rising tension between China and the USA may threaten regional stability.

Keywords Naval modernisation · Southeast Asia · Proliferation
South China Sea · Accident risk · Destabilisation

INTRODUCTION

Southeast Asian nations are acquiring more submarines for a range of reasons. The utility of submarines for covert surveillance and intelligence collection may be a more significant factor than the ability to sink ships. However, perceptions of the deterrent value of submarines are also a factor. Submarines are a classic force multiplier requiring a disproportionate

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response from an adversary. National prestige and a desire to keep up with one's neighbours are other considerations with submarine acquisitions. A submarine arms race may be developing in the region with submarines being acquired or submarine fleets expanded because neighbouring countries and potential adversaries have embarked on similar programs.¹ Submarines are weapon systems that, if acquired by one country, markedly affect the defence calculations of others and it is easy to slip into a competitive arms race.

The dangers associated with these developments are fourfold.² First, submarines are inherently dangerous weapon systems posing numerous dangers arising from their operations. Second, there are maintenance and support problems associated with operating relatively small fleets of submarines. Third, strategic dangers arise from having more submarines operating in the relatively confined waters of Southeast Asia. Lastly, trends with submarine detection pose longer-term risks that manned submarines may lose much of their attraction to regional navies. This chapter addresses these dangers and concludes with some ideas about how the risks might be reduced.

OPERATIONAL DANGERS

As the regular occurrence of submarine accidents around the world demonstrates, submarines are inherently dangerous vehicles. In acquiring submarines for the first time or building up submarine fleets, regional countries may be underestimating the risks of submarine operations. Even a relatively minor accident onboard can have catastrophic consequences. Then, there are the navigational risks associated with having more submarines operating in areas with a high level of fishing activity and dense shipping traffic. Parts of regional waters, particularly in and around the Spratly Islands in the South China Sea, are poorly charted, posing the risk of a submerged submarine striking an uncharted submerged reef or pinnacle.

The most infamous submarine accident in recent decades was the sinking of the Russian submarine *Kursk* in the Barents Sea in August 2000 with the loss of its entire crew of 118 personnel. The full crew of 70 of the Chinese submarine *Ming 361* suffered a similar fate in May 2003 when they all suffocated after a technical malfunction onboard leaked toxic fumes.³ In January 2008, an Indian Navy submarine was damaged after it collided with a merchant ship in the Arabian Sea.⁴ Then

in February 2009, French and British nuclear ballistic missile submarines collided while on patrol in the Atlantic.⁵ Despite the sophisticated sonar equipment onboard these vessels, apparently they were unaware of each other. Fortunately, the damage to the submarines was slight, but it could easily have been catastrophic. In August 2013, a series of explosions sank India's frontline submarine INS *Sindhurakshak*, killing 18 personnel, shortly before she was due to proceed on a classified war patrol.⁶

There have been several incidents in both Japanese and European waters when submerged submarines have caught the nets of fishing boats and dragged them under—in some cases with loss of life. A US submarine is believed to be responsible for the sinking of a French trawler off the Cornish coast in January 2004 with the loss of five lives.⁷ It is the duty of a submarine, when submerged to keep clear of surface ships. Thus, the accidents that have occurred involving a submarine and a surface ship have been entirely the fault of the submarine. On the surface, a submarine obeys the rule of the road like any other vessel, but at night it can be difficult to see a surfaced submarine and appreciate its course and length. These are all important considerations for submarines operating in areas of high fishing and shipping activity such as the South China Sea, or in busy waterways such as the Malacca and Singapore straits.

Even the most proficient operators of submarines, including the US Navy and the Royal Navy, suffer submarine accidents with depressing regularity. In July 2016, HMS *Ambush*, one of Britain's newest nuclear attack submarines collided with a tanker off Gibraltar while conducting the demanding training course for submarine commanding officers, known as 'The Perisher'.⁸

Accidents involving US submarines provide a graphic reminder of the inherent risks of submarine operations. The worst incident in the past 15 years involving an American submarine occurred off Honolulu on 9 February 2001 when the USS *Greeneville* surfaced underneath the Japanese fisheries research vessel *Ehime Maru*, sinking it with the loss of nine lives.⁹ Then in 2005, the USS *San Francisco* hit an under-sea mountain in the Pacific, killing one sailor and injuring 24 others. In late December 2006, two sailors were swept to their deaths from the hull of the USS *Minneapolis-St Paul* in rough weather off Plymouth in the UK.¹⁰ About a week later, the USS *Newport News*, travelling submerged, hit the large Japanese tanker *Mogamigawa* while passing through the Straits of Hormuz.¹¹ In March 2009, the submarine USS *Hartford* collided with the amphibious ship USS *New Orleans* in the Persian Gulf in March 2009 causing serious damage.¹²

This string of submarine accidents shows that the underwater environment is a dangerous one. Submarines face many dangers. They have an extremely small margin for error. Even a small fire, flooding, or gas leak inside a submerged submarine can have tragic consequences, possibly even the total loss of the vessel and her crew. Arguably, submarine operations are among the most dangerous operations routinely conducted by defence forces.

The dangers of submarine operations are accentuated because submarines suffer from very severe command and control (C2) limitations. Submarine C2 has made nowhere near as much progress as C2 has in other types of military operations.¹³ Communications with submarines, particularly if they are engaged on sensitive missions, may not always be reliable and comprehensive standard operating procedures must be in place to deal with all eventualities. A submarine may be out of radio contact for extended periods of time. Radio waves do not penetrate sea water to any extent, and a submarine has to put itself, or an antenna, close to the surface to make radio contact. However, in many operational circumstances, this may not be possible. Required command and control procedures include ones for dealing with incidents when submarines are overdue in reporting their location or that they have surfaced (referred to as 'Submiss/Subsunk' procedures).

MAINTENANCE AND SUPPORT RISKS

The problems with building up and maintaining a submarine force are significantly greater than is commonly understood or acknowledged.¹⁴ These problems arise from the difficulties both with providing the necessary level of technical support for the vessels without reliance on overseas support and with providing crews that are adequately trained and experienced. Overall, a submarine that lacks a well-trained crew or a competent shore maintenance organisation will not accomplish much of what is expected from the capability.¹⁵

Submarines require a higher level of maintenance and experience longer periods out of service for routine maintenance than surface warships. This means that countries with small submarine fleets have a problem with balancing the requirements of training and operations.¹⁶ International submarine experts also point out that a country operating a small fleet of submarines (12 boats or less) becomes locked into technical and logistic support from the country of origin of the submarines.¹⁷

This dependence may place limitations on the strategic employment of the submarines.

Personnel issues are a major problem. Human error is a major cause of accidents at sea generally and submarines are no exception. Submarine crews must be highly proficient, but some in Southeast Asia may fall short in this regard, particularly in the navies that have only recently entered the submarine business. As one knowledgeable observer has noted, 'It takes decades of submarine service to develop the tactics, techniques, procedures and doctrine, backed by experience, to be effective'.¹⁸

Submarine commanding officers in particular have a huge responsibility. Their training and experience must be commensurate with this responsibility. Navies must be confident that their submarine commanding officers are competent to handle serious incidents, including ones that could escalate into conflict, on their own initiative and without guidance and direction from ashore. Despite how well one's own submariners are trained, submarine safety is like road safety: The avoidance of an accident also depends on the skill of the other driver and the quality of the road rules. And there will be more drivers on regional undersea highways in the future without any rules in place.

Difficulties can also be experienced with attracting personnel to serve in submarines. Life aboard a submarine is tough, operations can be hectic, quarters are cramped, the vessel can be submerged for long periods, and the health of crew members can suffer as a result.¹⁹ To make up for these unattractive working conditions, the Royal Australian Navy has found it necessary to pay large bonuses to attract and maintain personnel to crew its submarines.²⁰

STRATEGIC DANGERS

Numerous implications for regional security flow from the proliferation of submarines in the region. As well as the risks of a submarine 'arms race', there is a greater possibility of incidents involving submarines leading to increased tensions or even conflict. 'Intruder' submarine incidents, such as a foreign submarine being detected submerged in another country's territorial sea, may occur in the future as submarines increase in number and regional anti-submarine warfare (ASW) capabilities improve.

States are extremely secretive when discussing submarine issues. This is contrary to the desirable principle of transparency in military acquisition programmes and operations. Surveillance, reconnaissance and

intelligence gathering are major roles for submarines in Southeast Asia. Conventional diesel-powered submarines such as those being acquired by regional navies are particularly well suited for special operations and intelligence work, especially inshore and in relatively shallow waters. Submarines can covertly listen in on communications, such as by cell phones, and other electronic emissions that are subject to ducting and not detectable from space or even from the air.²¹ Also, diesel-powered submarines can sit undetected on the bottom outside harbours or in other areas of interest and only approach the surface by night.

The undersea environment of Southeast Asia will be very busy in the future with increased risks of interaction between submarines of different nationalities and of submarines being detected on covert surveillance missions or in waters that are the subject of a sovereignty dispute. The risks of such incidents are worrying and a potential cause of conflict and tension in regional waters. Greater numbers of submarines pose new challenges for preventive diplomacy and maritime trust building in the region. Checks and balances are required to prevent the escalation into a conflict of a serious incident, involving a submarine.

Submarines are routinely used by most navies for covert surveillance and intelligence collection missions, during which they may 'intrude' into the territorial sea, archipelagic waters, or even the internal waters of another state. There is an inherent risk that a submarine engaged on such a mission may be detected by the ASW systems of the coastal state. The tactics employed by naval forces detecting a submerged 'intruder' submarine will be proportional to the military threat and strategic circumstances at the time. An 'intruder' submarine detected in an area of disputed sovereignty may well be subjected to attack. If the submarine considered that circumstances justified it being where it was and remaining submerged, it would have the right of self-defence and may well counter-attack its persecutor.

When an 'intruder' submarine is detected in the territorial sea, every measure should be taken short of force to require the submarine to leave.²² Relevant measures might include dropping non-lethal warning charges, or firing a depth charge or mortar bomb at a known safe distance from the submarine. However, ASW torpedoes are now the main weapons against submarines rather than mortar bombs and depth charges, and these cannot be used in a 'warning mode' to warn off an 'intruder' submarine.

Furthermore, anti-submarine and submarine weapons are clumsy ones with often an ‘all or nothing’ result. Political circumstances might well not justify large loss of human life. As the British found with the sinking of the Argentinean cruiser *General Belgrano* with large loss of life during the Falklands War,²³ it is not possible for a submarine to use ‘minimum force’ when it fires torpedoes. An attack by a submarine can be a drastic means of achieving limited goals. The damage that a submarine can inflict using its primary weapon systems, missiles and torpedoes, is nearly always fatal. Similarly, a successful attack on a submarine may result in total loss of the vessel and its crew, and this may be an inhumane outcome in the circumstances. It might lead to a dramatic escalation of the tension between the parties involved.

There are real risks of ‘intruder’ submarine incidents in the future, particularly in sensitive areas such as the South China Sea. The acquisition of submarines by Malaysia and Vietnam, as well as the expansion of the Chinese fleet, is almost certainly related to the conflicting claims of these countries to islands in the South China Sea, and the perception of a requirement to covertly monitor the activities of other claimants in the area. The ability to manage the types of situation that might arise will put a premium on command and control arrangements in regional navies and regional crisis management. Due to the risks of a submarine incident escalating into violence, the region requires agreed procedures to allow ‘intruder’ submarines or submarines detected submerged in the territorial sea of another state to identify themselves before being attacked.

Considerable intelligence effort is expended on obtaining the acoustic signature of foreign submarines so that they might be more readily identified in the future. The USNS *Impeccable* may have been undertaking this form of intelligence collection when it was harassed by Chinese vessels in the South China Sea in March 2009.²⁴ As submarine activity increases in East Asian seas, this form of intelligence collection is likely to increase.

Legal issues are an important consideration. A key limitation on submarine operations is that in accordance with the 1982 UN Convention on the Law of the Sea (UNCLOS), a submarine exercising the right of innocent passage either through the territorial sea of any country or in the archipelagic waters of Indonesia and the Philippines outside of archipelagic sea lanes is required to travel on the surface and show its flag.²⁵ Indonesia is particularly concerned about possible breaches of its sovereignty in its archipelagic waters.²⁶ It is sensitive to the movement of foreign warships and submarines through these waters, especially the possibility

of submarines travelling submerged outside of its declared archipelagic sea lanes. There have been several incidents over the years in Indonesian waters, involving Australian or American submarines, where Indonesia has queried submarine movements in its archipelagic waters. In 2000, President Wahid warned Singapore not to allow its submarines to stray into Indonesian waters, promising a swift military response should that occur.²⁷

LONGER-TERM DANGERS

Longer-term dangers arise from the proliferation of submarine fleets in Southeast Asia. There is potential for worrying developments with the proliferation of cruise missiles and even weapons of mass destruction. Submarine-launched land-attack missiles, mainly cruise missiles, such as Tomahawk, by the USA and its allies, have been a major development with submarine weapons that other countries are now seeking to emulate.²⁸ However, while cruise missiles are superficially attractive, considerable investment in external targeting systems is required if the long-range potential of these systems is to be exploited. This is likely to be beyond Southeast Asian countries in the foreseeable future although more technologically advanced and larger navies, such as those of China, India and Japan, will pursue their development.

Looking into the future, great advances continue to be made with ASW and submarine detection. These developments may be shifting the balance against the submarine. While technological developments with making submarines stealthier have almost reached a limit, developments continue with the ability to detect submarines both with acoustic and with non-acoustic systems—and with some mix of both. Perhaps it is not going too far to predict that in the foreseeable future submarines may become more detectable in coastal waters.²⁹ Thus, submarines may lose some of their attractiveness to regional navies.

Vast improvements in signal processing, which allow very small signals to be processed, have increased the performance of acoustic sensors. However, they still suffer from limitations dictated by the laws of the physics, and their performance has probably been taken about as far as it comes, except for developments with networking systems and different sensors. Hence, much greater attention is now being given to non-acoustic ASW sensors. These gain importance because submarines have become quieter, and greater attention is being given to littoral waters where the performance of acoustic sensors may be significantly degraded.³⁰

The ability of submarines to escape detection is decreasing as new detection techniques are developed that rely on phenomena other than sounds emanating from a submarine.³¹ Non-acoustic sensors include magnetic sensors, such as the magnetic anomaly detector (MAD), that exploit the magnetic signature of a submarine; electric field (ELFE) sensors that detect the electric fields created between moving parts of a submarine's machinery manufactured from different materials; infrared systems that detect thermal radiation from the mechanical and electronic 'hot spots' of a submarine; laser-based systems; electronic sensors that detect electronic transmissions from a submarine no matter how short they might be; synthetic-aperture radar to detect the wake created by a submarine or the 'hump' in the ocean surface created as a submarine moves through the water beneath; bioluminescence to detect the submarine's disturbance of marine plant and animals. Again non-acoustic sensors have benefited from great advances in signals processing, but they also have limitations. Magnetic sensors, for example, have limited range and are generally only useful for localising a submarine and confirming that the contact is in fact a submarine.

There is much research being conducted into non-acoustic ASW sensors, particularly in the USA. Further advances might be expected, including the ability to network a range of different sensors. Developments include the development of multistatic arrangements, networking a range of sensors, so that the sources of transmissions from a source (e.g. an active sonobuoy or surface ship sonar) are not co-located with the receiver which, for example, might be a co-operating submarine. Networking might include both acoustic and non-acoustic sensors. These reflect developments in computer processes to run detailed models to detect very small environmental changes made by a quiet submarine.³²

Other technological developments that could lead to marked changes in the regional requirement for submarines include the development of underwater drones that could take over much of the current covert surveillance and intelligence collection activities of submarines in Southeast Asia.³³

REDUCING THE RISKS

Experience elsewhere in the world suggests that it is only a matter of time before a serious submarine accident occurs in Southeast Asia. Measures are required to improve submarine safety in the region. Arrangements for water space management (WSM) and the prevention

of mutual interference (PMI) with submarine operations might be possible. A regional submarine Movement Advisory Authority along the lines of procedures currently followed by Western navies might be possible. This would mean that the parties to the regime know the operating areas of other submarines. However, this will be difficult in view of the covert nature of submarine operations and the sensitivity of regional countries to sovereignty issues. In the longer term, the establishment of submarine exclusion zones or 'no go' areas for submarines might be achievable, particularly in areas where sovereignty over islands and reefs is disputed.

Meanwhile, a range of prospective measures for mitigating the adverse consequences of regional submarine developments should be considered. These might include regional protocols for dealing with unidentified submarines detected in the territorial sea, including the procedures to be followed and signals to be used. These protocols might include an agreement that in normal circumstances, the submarine should not be attacked with potentially lethal force. Government-to-government 'hot-lines' between national submarine operating authorities might also be considered. Singapore has recently proposed an operational framework based to reduce the possibility of submarine-related incidents covering areas where regional cooperation is required, including common standards in terms of submarine safety regimes and agreement on a code of conduct that can guide submariners on what to do should their boat unexpectedly encounter another underwater vessel during an operation.³⁴

Continued regional cooperation is required on submarine training and safety, including submarine escape exercises and the development of protocols for cooperation to deal with missing or sunk submarines (SUBMISS and SUBSUNK procedures). A regional submarine rescue organisation might be introduced in which China, as a major operator of submarines, might play a part.³⁵ The US Navy has established the International Submarine Escape and Rescue Liaison Office (ISMERLO) in Norfolk, which is a logical location for it in view of the US Navy's long history in submarine rescue, but other states may have sensitivities about the ISMERLO extending its responsibilities to include Southeast Asian waters.³⁶

More submarines in the region are potentially destabilizing, particularly as they may be employed on covert missions in disputed waters. There are challenges here both for maritime confidence building and ensuring submarine safety. By their very nature, submarines are not well

suited to maritime confidence building measures, including an incident at sea (INCSEA) type agreements. In the longer term, arms control measures may have to be discussed to place limits on the numbers of submarines either absolutely or in particular areas. While naval arms control measures placing quantitative and qualitative limits on the numbers of submarines and their weapons systems are unlikely in the foreseeable future, they may become necessary if current trends continue.

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