Port Accessibility Study

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Introduction

- **AMCS GOSC tasked MTMCTEA to conduct a seaport analysis to clarify accessibility at ports in critical regions around the world**
  - **Analyzed 203 ports in 4 theaters: Southwest Asia, Europe, Northeast Asia, East Asian Littoral**
- **Study focus is on physical infrastructure characteristics of seaports**
  - **Port MLW depth, port maximum depth, channel MLW depth and width, berth MLW depth and length, beam restrictions**
- **Port throughput not evaluated due to time constraints**
  - **Some ports may not support military cargo operations**
  - **Berths may not have the structural integrity required to be militarily useful**
- **Determining seaport accessibility will assist in better defining future vessel design characteristics**
  - **Accessibility is the ability of a ship to call and berth at a seaport**

Study Methodology

- Determined study ports in each region by:
  - Used OPLANs, programmatic studies, wargames, DPG DPS
  - Referenced CAA Enabling Strategic Responsiveness Study 2003 and Complex Threats for Operations and Readiness (ACTOR) forecasts
- Gathered information and collected data from various commercial and in-house sources
  - Complete data sets not available for all ports
- Developed port infrastructure metrics for determining port accessibility
- Conducted numerical analysis by region and collectively
  - All calculations based only on available data unless otherwise noted

Data Sources

- **Commercial data sources include:**
  - **Lloyd's Register (Fairplay) Ports and Terminals Guide, 2003**
  - **Guide to Port Entry, 2003**
- **In-house data sources include:**
  - **GIS database**
  - **World Port database**

Port Max Depth

- Port maximum depth refers to the depth at high tide
- 99% of ports analyzed have a maximum depth exceeding 15 feet
- 92% exceed 25 feet
- 86% exceed 30 feet

Port Max depth	Percentage exceeding
15 feet	99%
25 feet	92%
30 feet	86%

Port MLW Depth

- Port MLW depth refers to the depth at mean low water or low tide
- 98% of ports analyzed have a MLW depth exceeding 15 feet
- 86% exceed 25 feet
- 66% exceed 30 feet

Port MLW depth	Percentage exceeding
15 feet	98%
25 feet	86%
30 feet	66%

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Channel MLW Depth

- 95% of ports analyzed have a MLW channel depth exceeding 15 feet
- 83% exceed 25 feet
- 73% exceed 30 feet

Channel MLW depth	Percentage exceeding
15 feet	95%
25 feet	83%
30 feet	73%

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Berth MLW Depth

- Data was collected for "most accessible" berths only
  - Longest and deepest berths at each port
  - Contiguous berths treated as non-contiguous
- 94% of berths analyzed have a MLW berth depth exceeding 15 feet
- 84% exceed 25 feet
- 64% exceed 30 feet

Berth MLW depth	Percentage exceeding
15 feet	94%
25 feet	84%
30 feet	64%

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Berth Length

- 91% of berths analyzed have a berth length exceeding 400 feet
- 85% exceed 500 feet
- 77% exceed 600 feet
- 59% exceed 800 feet
- 42% exceed 1,000 feet

Berth length	Percentage exceeding
400 feet	91%
500 feet	85%
600 feet	77%
800 feet	59%
1,000 feet	42%

Channel Width / Beam Restrictions

Only considering ports with available data (94 ports):

Beam	Percentage exceeding
75 feet	95%
100 feet	82%
150 feet	63%
200 feet	59%

All ports (203 ports):

Beam	Percentage exceeding
75 feet	98%
100 feet	91%
150 feet	82%
200 feet	80%

Assumption is that beam is not a restriction where not reported

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Beam / Channel Width v. Port MLW Draft

Only considering ports with complete data sets (94 ports):

% of accessible ports		MLW Draft		
		15 ft	25 ft	30 ft
Beam	75 ft	93%	89%	70%
	100 ft	80%	76%	59%
	150 ft	63%	59%	45%
	200 ft	59%	57%	42%

All ports (203 ports):

% of accessible ports		MLW Draft		
		15 ft	25 ft	30 ft
Beam	75 ft	96%	84%	66%
	100 ft	90%	78%	61%
	150 ft	82%	71%	54%
	200 ft	80%	69%	53%

Assumption is that beam is not a restriction where not reported

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Length v. Draft, Most Accessible Berths

- This table was derived from a graph of Berth Length vs. Berth MLW Draft
- Berth data reflects only the "most accessible" contiguous and non-contiguous berths

% of accessible berths		Berth MLW Draft		
		15 ft	25 ft	30 ft
Berth Length	400 ft	88%	81%	59%
	500 ft	84%	77%	58%
	600 ft	75%	70%	52%
	800 ft	59%	55%	41%
	1,000 ft	42%	40%	33%

AMCS Vessel Characteristics

	SD/HSS	TSV	HSS Mono	USN Vision Trimaran	USN Vision SES
Length (ft)	640	393	870	1,060	944
Beam (ft)	210	104	130	129	195
Max Draft (ft)	10.3	15	35	27.8	24.7

AMCS Vessel Accessibility

Data Filters: Port MLW Depth, Beam/Channel Width, Berth Length, Berth MLW Depth

Only considering ports with complete data sets (87 ports):

	SD/HSS	TSV	Mono	Trimaran	SES
Port Accessibility	54%	80%	26%	29%	35%

All ports (203 ports):

	SD/HSS	TSV	Mono	Trimaran	SES
Port Accessibility	65%	82%	22%	30%	39%

Design Considerations

- SD/HSS: Beam is excessive
- TSV: No concerns
- Mono: Draft is excessive and length is a secondary concern
- Trimaran: Length is excessive and draft is a secondary concern
- SES: Beam is excessive and length is a secondary concern

	SD/HSS	TSV	HSS Mono	USN Vision Trimaran	USN Vision SES
Length (ft)	640	393	870	1,060	944
Beam (ft)	210	104	130	129	195
Max Draft (ft)	10.3	15	35	27.8	24.7

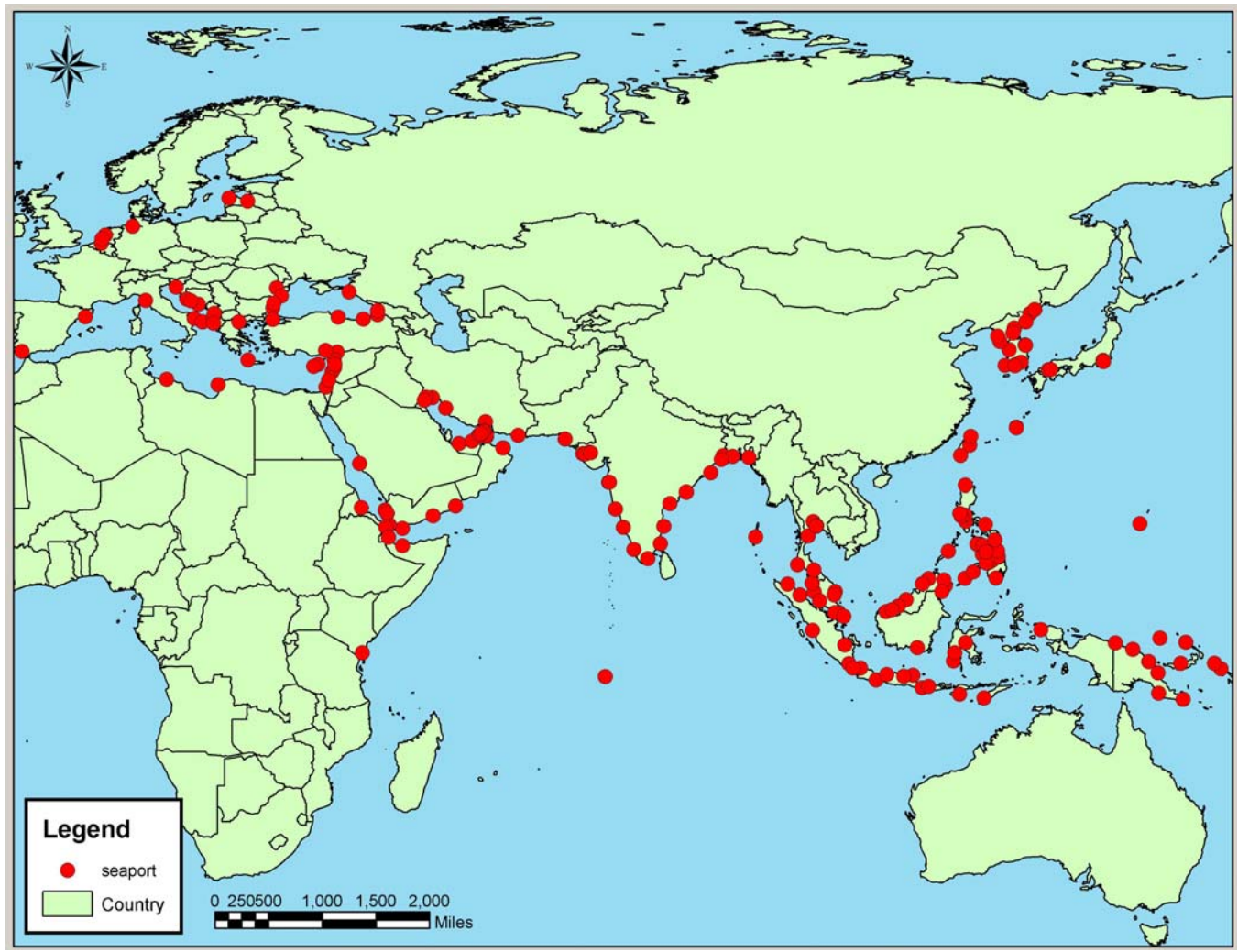
Notional Vessel Characteristics

- **Only considering ports with complete data sets (87 ports)**
  - **The following vessel characteristics would allow 70% port accessibility:**
    - **Draft not exceeding 25 feet**
    - **Length not exceeding 600 feet**
    - **Beam not exceeding 100 feet**

- **All ports (203 ports)**
  - **The following vessel characteristics would allow 66% port accessibility:**
    - **Draft not exceeding 25 feet**
    - **Length not exceeding 600 feet**
    - **Beam not exceeding 100 feet**

Back Up

Ports Analyzed



Southwest Asia

36 ports

SOUTHWEST ASIA	
Eritrea	***United Arab Emirates***
Assab	Ahmed Bin Rashid Port
Massawa	Ajman
Djibouti	Dubai-Hamriya
Djibouti	Fujairah
Iran	Jebel Ali
Abadan	Jebel Dhanna/Ruwais-NGL
Bandar Abbas	Khor Fakkan
Bandar Imam Khomeini	Mina Saqr
Bushehr	Mina Zayed
Chabahar	Port Rashid
Khorramshahr	Ras Al-Khaimah
Iraq	Sharjah
Umm Qasr	***Yemen***
Kenya	Aden
Mombasa	Hodeidah
Oman	Mocka
Muscat (Qaboos)	Mukalla
Pakistan	Nishtun
Karachi	Ras Alkatheeb
Saudi Arabia	Saleef
Jeddah	
Somalia	
Berbera	
Chisimaio (Kismay)	
Mogadiscio	

Europe

42 ports

EUROPE		
Albania	***Israel***	***Spain***
Durres	Ashdod	Barcelona
Shengjin	Haifa	Rota
Vlore	***Italy***	***Syria***
Belgium	Bari	Latakia
Antwerp	Brindisi	Tartous
Bulgaria	Livorno	***Turkey***
Bourgas	***Latvia***	Iskenderun
Varna	Riga	Mersin
Croatia	Ventspils	Samsun
Ploce	***Lebanon***	Tekirdag
Sibenik	Beirut	Trabzon
Split	Tripoli	
Rijeka	***Libya***	
Cyprus	Benghazi	
Limassol	Tripoli	
Larnaca	***Netherlands***	
Georgia	Amsterdam	
Batumi	Rotterdam	
Poti	***Romania***	
Germany	Braila	
Bremerhaven	Constantza	
Greece	***Russia***	
Suda Bay	Novorossiysk	
Thessaloniki		

Northeast Asia

49 ports

NORTHEAST ASIA		
Guam	***Philippines***	***Taiwan***
Apra	Bacolod	Chi-Lung (KeeLung)
Japan	Batangas	Hualien
Chim Wan	Cagayan De Oro	Kao Hsiung
Iwakuni	Cebu	
Kure	Claveria	
White Beach	Dadiangas	
Yokohama	Dumaguete	
Yokosuka	General Santos	
Korea (North)	Iligan	
Chongjin	Iloilo	
Haeju	Jolo	
Hungnam	Limay	
Nampo	Manila	
Senbong	Mariveles	
Songjin	Masao	
Wonsan	Nasipit Port	
Korea (South)	Ozamiz	
Kwangyang	Puerto Princesa	
Masan	San Carlos	
Mokpo	Subic Bay	
Mukho	Surigao	
Pyongtaek	Tabaco	
Tonghae	Tacloban	
Yosu	Tagbilaran	
	Zamboanga	

East Asian Littoral

76 ports

EAST ASIAN LITTORAL			
Bangladesh	***Indonesia***	***Malaysia***	***Singapore***
Chalna	Banjarmasin	Bintulu	Singapore
Chittagong	Belawan	Johor	***Thailand***
Diego Garcia	Benoa	Kemaman	Bangkok
Diego Garcia	Ciwandan	Kota Kinabalu	Laern Chabang
India	Kalianget	Kuantan	Phuket
Chennai	Kijang	Kuching	Prachuap Port
Cochin	Krueng Geukueh	Labuan	Siam Seaport
Haldia	Kupang	Lahad Datu	Songkhla
Jawaharlal Nehru (Nhava Sheeva)	Lembar	Lumut	Sriracha Harbour
Kandla	Makassar	Penang	
Kolkata	Malili	Port Kelang	
Machilipatnam	Palembang	Sandakan	
Mandvi	Panjang	Sibu	
Mormugao	Pare Pare	Tanjung Manis	
Mumbai	Sorong	Tanjung Pelepas	
Mundra	Surabaya	Tawau	
Nagapattinam	Tanjung Emas (Semarang)	***Papua New Guinea***	
Navlakhi	Tanjung Intan (Cilacap)	Alotau	
New Mangalore	Tanjung Perak	Anewa Bay	
Paradip	Tanjung Priok (Jakarta)	Buka	
Port Blair	Waingapu	Kavieng	
Tuticorin	Teluk Bayur	Kimbe	
Visakhapatnam		Lae	
		Lorengau	
		Madang	
		Port Moresby	

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