

2001

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Recommended Citation

Wood, Piers M. and Ferguson, Charles D. (2001) "How China Might Invade Taiwan," *Naval War College Review*: Vol. 54 : No. 4 , Article 5.

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Naval War College Review, Autumn 2001, Vol. LIV, No. 4

HOW CHINA MIGHT INVADE TAIWAN

Piers M. Wood and Charles D. Ferguson

While defense analysts agree that the Taiwan Strait remains a flashpoint for armed conflict because of China's near obsession with reunification with Taiwan, these analysts generally fall into two camps regarding China's ability to carry out a successful invasion against Taiwan, either today or in the foreseeable future.

One camp enumerates disproportionate numerical advantages in combat aircraft, soldiers, submarines, etc., that the People's Republic of China enjoys over Taiwan and also cites China's acquisition of advanced Russian *Sovremenny*-class destroyers, SS-N-22 Sunburn antiship cruise missiles, and Sukhoi-27 combat aircraft. While stopping short of predicting an easy victory over Taiwan, these analysts typically conclude that the United States must increase its military ties with Taiwan.¹ Other analysts envision a marked decrease in Taiwan's military capabilities in mid-decade that could give China an edge by the end of the decade. Some point out, however, that even massive U.S. arms shipments to Taiwan would do little in the short term to enhance the island's defenses, because of the time it would take Taiwan's military to absorb the new equipment.²

The other camp, in contrast, recognizes Taiwan's qualitative advantage in combat aircraft and warships. Moreover, this group perceives the difficulties inherent in an invasion of Taiwan and grasps the natural advantages possessed by defending forces.³ Although these analysts acknowledge that Chinese modernization could someday prove decisive in a future invasion attempt, they usually place this development ten or twenty years hence.

The first school of thought is flawed by its reliance on more or less sophisticated "bean counts" that stop short of a full operational analysis. The second camp, for its part, is playing by Western rules and perhaps forgets that twice in

the last fifty years the United States has underestimated the determination of Asian militaries, with severe consequences. Further, both groups generally presume that an invasion would be an all-or-nothing proposition, positing that an invasion must occur in one fell swoop (the “nothing” possibility including an “escalating ladder” of threats meant to intimidate Taiwan into capitulation without an invasion). By and large, they neglect, or do not probe in detail, a third contingency—a phased military operation. Faced with operational realities, military professionals most often think in terms of extended campaigns. However, in this case the staging aspect has been so seldom addressed recently that few modern readers are even aware that the Peng Hu Islands (formerly the Pescadores) sit astride the invasion routes across the Taiwan Strait—as hard to ignore, tactically, as an ox in the living room.

As a contribution to the debate over whether or not China possesses the capability to invade Taiwan in the near term, this article assesses this missing factor from a doctrinal perspective and finds that a phased invasion, one that ratchets up the level of offensive operations, has a better prospect of success than an all-out attack against the main island of Taiwan. While we make no predictions about the success or failure of a Chinese invasion against Taiwan in the foreseeable future, we caution that a determined China could launch an invasion sooner than the five, ten, or twenty years that some have projected, though it would be unlikely to succeed if it made the attempt today.

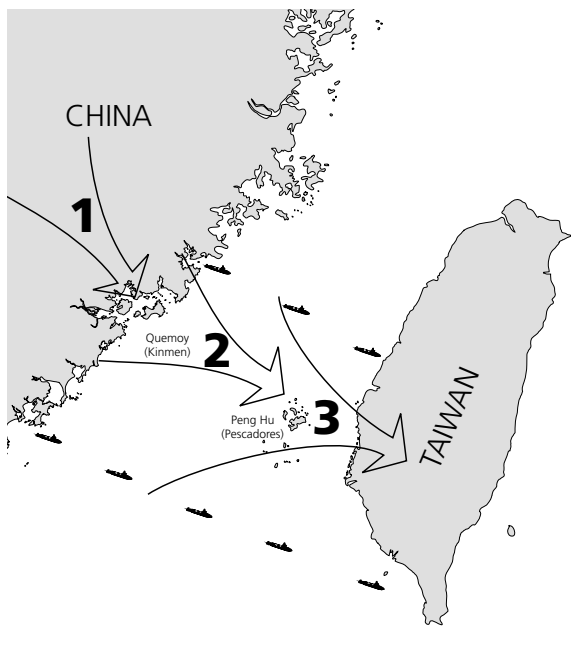
PHASED INVASION

The People’s Liberation Army could realize a number of important advantages, should it invade Taiwan, by conducting the operation in three phases: seizing Quemoy (Kinmen) and other islands close to the mainland, capturing the Peng Hu Islands, and assaulting Taiwan’s west coast. By attacking these objectives in succession, the Chinese could amass great numerical superiority against each one in turn and render the next object less defensible. This stepping-stone strategy would place the defenders in the predicament of deciding whether to absorb casualties fighting for key terrain currently under attack or to conserve resources for a final stand on the main island.

Phasing could work to the Chinese advantage for other reasons as well. Beijing could exploit the initial phase domestically, creating a state of war fever that would generate support for military construction projects that would in turn be essential for succeeding phases but would seem unjustifiable in peacetime. Moreover, a break after the first two phases would allow an opportunity for major upgrades in military training, taking advantage of experience gained in what would amount to combat “rehearsals” for an assault against the main island. Long halts would keep the door open for a general surrender or a favorable

negotiated settlement with Taiwan. Notably, the preliminary phases might also be viewed as less than a full attack on the island, and thus as not justifying U.S. military intervention.

For the People's Liberation Army, an attack on Quemoy represents more an opportunity than a risk. Although Quemoy is heavily fortified with tunnel and bunker complexes, the Chinese would have little difficulty amassing five-to-one odds against Quemoy's fifty-five thousand defenders. Also, because of its proximity to the mainland and the shallow depth of the water between, an attack on Quemoy would resemble less an amphibious invasion than a river crossing. Accordingly, the Chinese could safely presuppose one of the cardinal precepts of amphibious doctrine, air superiority. That is, they could conduct the attack under the umbrella of air defense forces—both on the mainland (long-range surface-to-air missiles belonging to the People's Liberation Army Air Force) and missile and anti-aircraft-artillery forces integral to the army assault units themselves. Keeping the Chinese air force largely out of this battle would preserve its aircraft, while air defense forces could shoot down some of the Taiwanese air force's best aircraft—unless the Taiwanese held them back. Chinese anti-air artillery would have two factors in its favor: huge numbers and concentration of firepower. The Chinese could employ about sixteen thousand air-defense artillery tubes, compared to the four thousand guns that Iraq had in the Persian Gulf War. Also, and again in contrast to DESERT STORM, this battle would take place in a confined space—fifty miles of coastline and inland perhaps thirty-five miles.



The Peng Hu Islands, the second-phase objective, comprise a dozen or so rocky islets in the Taiwan Strait, thirty miles from Taiwan. Because the Taiwanese forces (currently numbering sixty thousand) on the Peng Hus could threaten the flank of an assault against the main island, the Chinese must take these islands first in any case. By the same token, however, once seized these islands could prove useful in preparing for the final invasion.

The actual amphibious landings in the Peng Hus would be on a much smaller scale than the mammoth invasion of the main island, but it would serve as a test of China's capability. Unlike the first phase, without air superiority and

at least some measure of sea control, any hope of victory in this phase, and accordingly in the overall campaign, would be lost. Absent those prerequisites, the offensive forces might be obliged to abort the operation, making an assault on Taiwan one of history's nonevents—like Hitler's invasion of England.

This is not to say that success *requires* a multistaged campaign. The point here is that the time factor dramatically changes the operational parameters of a cross-strait invasion—Taiwanese defenders are in much greater peril from a methodical campaign than from an abrupt, full-scale assault. So also, Beijing politicians may see strategic safety in such incrementalism.

OPERATIONAL REQUIREMENTS

A clear understanding of the essential requirements of any amphibious operation—whether or not conducted in phases—is necessary in determining whether China could invade Taiwan. U.S. joint amphibious doctrine—which, based upon historical experience, is the most authoritative source for any amphibious warfare—sets out four fundamental precepts for amphibious operations.⁴ The first is that air superiority must be achieved before embarkation of troops and maintained throughout the assault and landing. Second, sea control—ideally, outright sea denial—is necessary to ensure freedom of movement at sea and thereby protect troop transports and prevent naval counterattacks. Third, carefully choreographed sea lift from embarkation to landing is vital for the coherence of tactical units on the beach, and sea-lift capacity must be sufficient to give the ground assault a numerical advantage. Finally, the landing force must achieve fire superiority on the beach before launching the assault. Fire support—naval gunfire, close air support, and field artillery—must be reliably and quickly available.

Before examining these requirements in detail, we need to specify a set of reasonable assumptions to bound the analysis. The first is that China would not resort to nuclear war.⁵ Further, we posit that China would not launch a “people's war” of insurgency. The third assumption is that the United States would not militarily intervene before China actually attempted to establish an amphibious beachhead on the island.

Air Superiority

Air superiority represents the most critical precept, because the other factors depend upon it. Therefore, for the purposes of this analysis, we assume that China would not proceed with an invasion unless it could achieve air superiority.

Virtually all practitioners of amphibious warfare have considered sea control and air superiority to be prerequisites to landing. . . . The amphibious attacker has the initiative. If control of the sea and air is not gained at least in the immediate area of a

landing, the attacker can postpone or cancel the landing. The defender has no such option. The corollary, of course, is that a defender can usually deter a landing by maintaining air and sea control.⁶

Table 1 displays the quantitative advantage of China in fighter and attack aircraft versus Taiwan.⁷ However, the Chinese air force and naval aviation are qualitatively outmatched. Only the Russian-made Su-27 long-range air-superiority fighter and the Su-30 (a two-seat, multirole, long-range interceptor version of the Su-27) come close to matching the most advanced Taiwanese aircraft.

**TABLE 1
CHINESE/TAIWANESE EQUIVALENT FIGHTER/ATTACK AIRCRAFT**

PRC (fmr Russian designation)	Low Est.	High Est.	Taiwan	Inventory
J-11 (Su-27)	48	65*	F-16	150
—(Su-30)**	—	40*	Mirage 2000	60
J-8	100	300*	IDF (Ching-Kuo)	130
J-7 (MiG-21)	600	780*	F-5	200
J-6 (MiG-19)	1,750*	3,450		
Q-5	330*	600		
J-5 (MiG-17) and J-4 (MiG-15)	0	400		
Total	2,830†	5,635		540

*IISS figures (giving a total of 3,300).

**Su-30 MKK, “delivered but not in service,” hence no PRC designation.

†Defense Dept. unclassified total is 4,300 “tactical fighters.”

Nonetheless, before discounting the impact of the Chinese quantitative advantage, one should consider two crucial factors not properly emphasized in the literature.⁸ First, China’s principal objective in the air war would be to attack airfields in order to reduce the sortie rate of defending aircraft, *not* to maximize air-to-air kills. Second, China can build fields close enough to Taiwan to allow even older aircraft to reach the island in large numbers. Presently, it can support in revetments about 1,100 combat aircraft in the twenty-two airbases within 370 miles—that is, within striking distance—of Taiwan.⁹ In addition, there are perhaps two dozen more air facilities between 370 and five hundred miles from Taiwan. Their aircraft could defend the bases closer to the coast and replace aircraft shot down.

However, it would do the People's Liberation Army Air Force little good to reduce the defenders' sortie rate if China could not quickly "turn around" aircraft—that is, keep large numbers of its own aircraft over enemy airfields. The Chinese sortie rate, in turn, would depend upon the capacity of close-in airfields. Clearly, China cannot achieve air superiority, and therefore cannot invade Taiwan, until it builds new airfields near Taiwan or greatly expands existing ones. By the same token, it might be imprudent to presume that China cannot rapidly do so; airfield construction does not require advanced technologies. A nationwide reallocation of resources would get the job done in a matter of months, not years.

As for China's ballistic missiles, certain crucial factors deserve emphasis. The current inaccuracy of these missiles means that, at the current rate of buildup, China will require several more years to produce missiles in sufficient numbers to damage Taiwanese airfields significantly enough to retard their sortie rates.¹⁰ However, the most important effect of preemptive missile strikes would be the suppression of air defenses. Missiles would be especially effective for that purpose were the Chinese to incorporate cluster munitions, which would spread thousands of bomblets over wide areas.¹¹

Sea Control

Air cover would not completely protect the movement and landing phases of the invasion from the defending fleet. The Taiwanese navy has thirty-five principal surface combatants, compared to fifty-three for China. Nonetheless, and despite plans to acquire advanced destroyers from Russia, the Chinese navy is qualitatively outmatched in most categories of warships. Its surface combatants alone could not protect the landing force in transit and secure the supply lines thereafter. China's submarine force would be the key factor in offsetting the Taiwanese navy's impressive capabilities.

China's seventy submarines—against Taiwan's four submarines (two of the World War II-vintage "Guppy" type)—could establish a corridor just before the assault, in a form of sea denial uniquely suited to the confined Taiwan Strait. Even Taiwan's advanced antisubmarine warfare resources—including seven frigates of the *Cheng Kung* (*Oliver Hazard Perry*) class, with antisubmarine helicopters—could not effectively oppose so many boats.¹² Submarines guarding both sides of the swept zone could deny passage to Taiwanese surface combatants with reasonable effectiveness; depending on the assault route, each submarine would be responsible for as small a sector as two to five miles.

On the other hand, because most of the strait is fairly shallow, Chinese submarines would have limited ability to hide. Some might operate on or near the surface, losing much of their advantage. However, the southeasterly approach

from China to Taiwan offers deeper waters and perhaps therefore a logical attack corridor. Although using submarines to establish an attack corridor is a bit unorthodox, it could be a major mistake for Taiwan's navy to ignore the possibility.

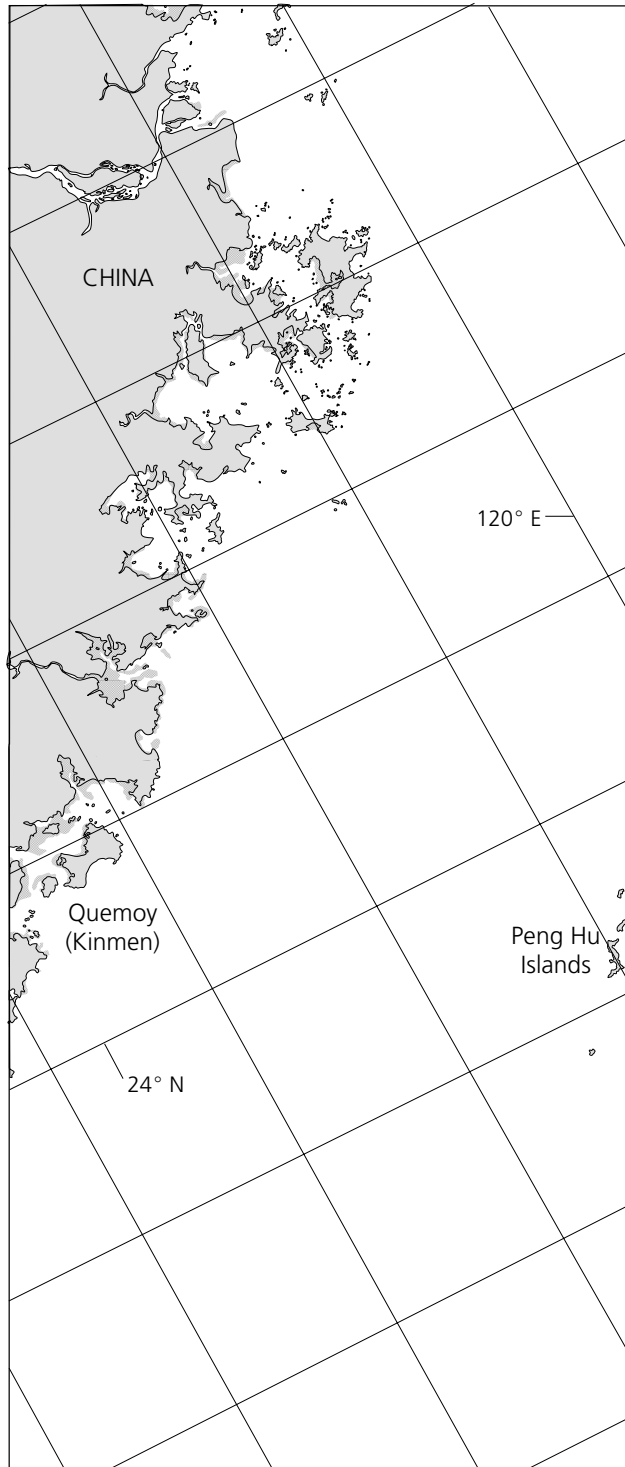
Sea Lift and Taiwan Strait Transit

Of the lengthy lists of combat tasks that would face the invaders, two critical ones stand out: moving the requisite multitudes to the battlefield and, once on the beach, achieving superiority at some point. Many analysts claim that both are presently beyond China's capabilities.

China has a large merchant fleet, with an enormous capacity for personnel and cargo. Its fifty naval amphibious ships and between two hundred and 350 landing craft, however, would be utterly unable to carry the entire combined-arms force.¹³ It would be logical to devote military amphibious vessels exclusively to heavy weapons like tanks and artillery rather than personnel; in any case, bow ramps are just about the only way to get this bulky hardware ashore in an assault. If the amphibious ships were devoted entirely to tanks and the landing craft to artillery, more than 250 tanks and almost seven hundred pieces could be put ashore in one wave.¹⁴ This is not impressive for a landing force that could number over a hundred divisions—a single U.S. armored division has more tanks, and the artillery would outfit only about ten U.S. divisions; still, specialized amphibious craft could rapidly shuttle tanks and artillery ashore. In any case, it has always been difficult, for any nation, to get tanks and artillery ashore. That is why heavy reliance upon infantry, naval gunfire, and close air support is a hallmark of amphibious operations everywhere.

Meanwhile, the Chinese merchant fleet could be transporting upward of two million troops, in regular passenger ships and on cargo vessels temporarily adapted for troops—but without excruciating effort to get them all on board.¹⁵ With the present port capacity of China's southeastern coast, embarkation of troops would be time-consuming. A choice would have to be made between shuttling relatively small waves of troops to the beach and forcing early-loading ships to hover offshore, vulnerable to attack, while the remaining vessels queue up for pier space. Despite frenzied port construction over the last decade or so, the ports from Shanghai to Hong Kong could accommodate sufficient shipping to load only about two hundred thousand troops at any one time. This is only 10–13 percent of the possible force.¹⁶ Still, upgrading port capacity—like building airfields—would not exceed China's competence, if it were willing to reallocate resources and postpone civilian-sector endeavors.

The difficult part of transporting troops, once successfully embarked, to their objectives would be transferring them from large ships to small vessels able to run aground close enough to the shore to disembark personnel in shallow water.



Most “China hands” agree that China has in excess of a hundred thousand small seagoing fishing vessels. If each one carried thirty troops—a conservative assumption—the last few tens of miles, only half of them would be required to land 1.5 million troops.¹⁷

U.S. amphibious doctrine puts a great deal of emphasis on the organization of the ship-to-shore movement of the assault landing force. The Chinese would experience great difficulty in this respect, using civilian craft, and so many of them. Amphibious doctrine calls for meticulous “reverse embarkation,” or “combat loading,” of transports—loading last everything that will be needed first, so that it will be readily accessible in the holds; keeping all boats carrying particular ground units near each other; and forming painstakingly sequenced “boat groups” within “boat waves,” making up still larger “flotillas.” The principal concern is to preserve the tactical organization of army units. Without this coherence, landed in isolated, intermixed groups, the troops would become a mob, ripe for slaughter.

A modern innovation in navigation might help the Chinese orchestrate the tens of thousands of small boats: Global Positioning System receivers could help each craft find its exact destination.¹⁸ Soldiers could, therefore, be



reasonably certain of joining their larger units in a short time. Employing this technology could make the Chinese doctrinal innovators in amphibious warfare.¹⁹

Whatever new technology the Chinese may adopt, however, the operational key is the enormous “lift” potential of their commercial fleets. This capacity has too frequently been written off, and its omission unrealistically diminishes China’s ability to realize its numerical advantage on Taiwan’s doorstep.

Beach Landing and Assault

Normally, in frontal attacks the defenders have the upper hand. However, in the amphibious situation, certain advantages accrue to the offensive. It has the initiative; the landing force commander chooses the time of attack and, with the inherent flexibility of movement upon the open sea, the exact location. In this case, Taiwan would surely know that the Chinese were coming, but not precisely when or where; the attacker would have, almost automatically, the advantage of tactical surprise.

The Taiwanese have nearly two million people in their armed forces, including reserves, which at first glance makes the two sides seem equal. However, uncertainty would compel Taiwan to spread its force over the 250-mile coastline

opposite China. Its surveillance and warning system would likely be degraded, if not saturated, by the vast number of contacts in a strait clogged with vessels. The Chinese presumably would deliberately overload Taiwan's surveillance sensors rather than try to evade them.

Furthermore, even if somehow Taiwan managed to evacuate and bring home all five divisions presently stationed on offshore islands, its twenty-one divisions (including marines and seven divisions of reserves, but excluding two divisions of armor and mechanized forces) would have to defend frontages of almost thirteen miles each. That would be a considerable challenge: in June 1944 the German forces holding the Normandy beaches, with frontages of less than ten miles per division, lost the beachhead to a hundred thousand Allied troops in under forty-eight hours.

With the at least theoretical capability of moving almost two million soldiers in one "lift," the Chinese would probably be able to mass sufficient infantry somewhere to overwhelm the defenders. Once ashore, the sheer size of China's total force, given air and sea superiority, would make it difficult for the Taiwanese to counterattack effectively. It is unlikely they could entirely eliminate a beachhead—even with their qualitatively superior armored forces. To recall Normandy again, the German army's inability to move armor against the beaches because of Allied air superiority teaches an important lesson.

Nonetheless, the Chinese would find the number of tasks in a final assault, and the complexity of integrating them, daunting. In particular, they would have to sustain air superiority over an extended period. Moreover, the commander ashore would have to organize an airmobile theater reserve, a force combining parachute and heliborne units. Just to get ashore, the landing force commanders would have to improvise extensively to deal with the inhospitable Taiwanese west coast, which is mostly mud flats, with significant tidal ranges. The Chinese would also have to contend with two monsoon seasons, from August to September and from November to April; it would be restricted to two "windows" of attack, from May to July and the month of October. Still, such impediments did not thwart U.S. amphibious forces at Inchon during the Korean War; nor did coral reefs and an extremely low tide prevent the seizure of Tarawa in World War II.

LIKELIHOOD OF AN INVASION

No prudent military planner can dismiss the possibility of a successful invasion of Taiwan. The numerical advantages of the Chinese in almost every relevant military category are unambiguous and overwhelming. Although it might be years before any Chinese soldier sets foot on Taiwan itself, the early stages of a phased offensive could begin earlier than expected—that is, long before the year

2005, widely described as the soonest that China could project force beyond its borders.

There are, of course, a number of big “ifs.” *If* the Chinese air force failed to gain air superiority, or *if* the navy could not get millions of troops afloat, an attack would halt even before embarkation. Well before any attempt, *if* China did not expand its airfield capacity near the coast facing Taiwan, it could not even contemplate air superiority; similarly, *if* China had not significantly expanded its port capacity in the same region, it could not use effectively the sea lift to be requisitioned from the merchant marine. Sea control would be contingent on the submarine force’s ability to sweep and hold a security corridor from shore to shore; *if* that corridor were breached, the assault forces would most likely be destroyed en route. *If*, having crossed, the assault waves could not maintain coherence among the great mass of men and materiel, the defenders would prevail.

However, a determined government in Beijing may be able to overcome these obstacles; it would need neither technological magic, super-weapons, spectacular leaps in weapons production, nor even a foreign benefactor. It would need a wrenching reallocation of resources. A nation’s willingness to make great sacrifices cannot be assumed, but a sound military analysis cannot ignore the possibility. Underestimating the determination of seemingly overmatched Asian powers has been a common American failing since 1950.

Another *if* is the delicate cross-strait military balance. Any dramatic tilt toward Taiwan’s favor in the rough military equivalence—all factors considered—that currently exists could limit Chinese offensives to Quemoy and other small islands near the mainland. The new arms sales requisite for such a shift would hardly dismay the Pentagon. However, Sino-American relations would surely suffer, and as some analysts have pointed out, such an increase in arms shipments could backfire, precipitating a preemptive strike before Taiwan had time to assimilate the new equipment. The authorities in Taipei, in any case, might choose to produce indigenously, or procure from other nations, whatever arms could protect them from a cross-strait invasion.

The negative “ifs,” however, are balanced by a number of important “coulds.” The People’s Liberation Army *could* commandeer an enormous range of civilian assets that would contribute directly to its capabilities. China *could* transport millions of personnel across the strait, choked with fifteen hundred ships and tens of thousands of small vessels. Its air force *could* deliver ordnance with over three thousand jet aircraft (though not in a single wave). A landing force *could* overwhelm or outlast the Taiwanese army once it was firmly ashore.

Most significantly, the Chinese *could* phase an invasion over time to gain operational advantages, maneuvering successively against Taiwan’s untenable off-shore islands. Such a multistaged campaign would maximize China’s inherent

capacity to sustain a war of attrition, and it might well produce in effect a defeat in detail, should Taiwan defend each position. Even if Taiwan chose not to fight for every foot of ground, the advantages of an extended time frame would seem to accrue to China.

The world will not know which camp of contending analysts will win this debate unless China actually attacks Taiwan. We are confident that those who continue to ignore the significance of airfields, submarines, commercial sea lift, and sequential campaigning will not have prepared the nation for the worst-case contingency.

NOTES

1. For example, see Stephen J. Yates, "Why Taiwan's Security Needs to Be Enhanced," Heritage Foundation Executive Memorandum 632, 25 October 1999; Edward Timperlake and William C. Triplett II, *Red Dragon Rising: Communist China's Military Threat to America* (Washington, D.C.: Regnery, 1999); Barbara Slavin and Steven Komarow, "China's New Russian Destroyer Raises Concerns for Taiwan: Current Arms Deliveries Could Play Havoc with U.S. Strategic Equation," *Detroit News*, 21 November 1999, p. A21; and Bill Gertz, "China Targets Taiwan with 2nd Missile Base: Can Now Hit All Military Posts on the Island, Pentagon Says," *Washington Times*, 8 December 1999, p. 1.
2. David Shambaugh, "A Matter of Time: Taiwan's Eroding Military Advantage," *Washington Quarterly*, Spring 2000, p. 119.
3. For example, see Michael O'Hanlon, "Why China Cannot Conquer Taiwan," *International Security*, Fall 2000; Russell D. Howard, "The Chinese People's Liberation Army: 'Short Arms and Slow Legs,'" U.S. Air Force Institute for National Strategic Studies [hereafter INSS], Occasional Paper 28, Regional Security Series, September 1999; Denny Roy, "Tensions in the Taiwan Strait," *Survival*, Spring 2000, pp. 76–96; James H. Nolt, "U.S.-China-Taiwan Military Relations," *Foreign Policy in Focus*, World Policy Institute, April 2000; and David A. Shlapak, David T. Orletsky, and Barry A. Wilson, *Dire Strait? Military Aspects of the China-Taiwan Confrontation and Options for U.S. Policy* (Santa Barbara, Calif.: RAND, 2000). Jianxiang Bi, "Managing Taiwan Operations in the Twenty-first Century," *Naval War College Review*, Autumn 1999, pp. 30–58, would be a variant, arguing that the PRC is poorly prepared but might feel obliged to try anyway.
4. U.S. Defense Dept., *Joint Doctrine for Amphibious Operations*, Joint Publication 3-02 (Washington, D.C.: Joint Staff, 8 October 1992).
5. John Wilson Lewis and Xue Litai, *China Builds the Bomb* (Stanford, Calif.: Stanford Univ. Press, 1988), p. 242. China has announced that its no-first-use policy applies to Taiwan, that it will not use nuclear weapons against other Chinese, including Taiwanese. Eric Lin, "Face-Off: Maintaining the ROC-PRC Military Balance," trans. Phil Newell, *Sinorama*, October 1998.
6. Theodore L. Gatchel [Col., USMC (Ret.)], *At the Water's Edge* (Annapolis, Md.: Naval Institute Press, 1996), p. 207.
7. Unclassified sources vary widely on the Chinese air force's and naval aviation's total fighter and attack aircraft. Sources include: International Institute for Strategic Studies [hereafter IISS], *The Military Balance, 2000–2001* (London: Oxford Univ. Press, 2000); *Jane's Sentinel Security Assessment, China and Northeast Asia* (Coulsdon, Surrey, U.K.: Jane's Information Group, 1999), pp. 89, 100, 504; and James Mulvenon, ed., *China, Facts & Figures, Annual Handbook* (Gulf Breeze, Fla.: Academic International Press, 1998), vol. 23, pp. 87–8. Reported totals range from a high of almost six thousand "warplanes" to a low of 2,800 fighter/attack

- aircraft. The U.S. Department of Defense's total of 4,300 tactical fighters—most of which are characterized as obsolete—is a reasonable benchmark. See U.S. Defense Dept., *Annual Report on the Military Power of the People's Republic of China*, 22 June 2000, p. 18, available on the World Wide Web: <http://www.defenselink.mil/news/Jun2000/china06222000.htm> (accessed 18 March 2001).
8. See O'Hanlon, pp. 51–86; and Shlapak et al. O'Hanlon and Shlapak and his colleagues are among the small number of analysts who acknowledge that China might achieve air superiority but ultimately dismiss the possibility—perhaps too readily.
 9. Vernon Loeb, "China vs. Taiwan," *Washington Post*, 17 May 2000, p. A25; and Agence France Presse, "U.S. Scientists Downgrade China's Air Power Capability versus Taiwan," 13 May 2000.
 10. Assessments are that China is deploying fifty to a hundred short-range ballistic missiles (SRBMs) per year along the coast across from Taiwan. Estimates of the currently deployed SRBMs range from 150 to three hundred. China would need up to 1,575 SRBMs to incapacitate Taiwan's sixty-three airstrips. Our conservative calculations presume a two-hundred-meter circular-error-probable accuracy; a 95 percent probability that an SRBM will successfully complete its flight; a minimum operating-strip of length 1,525 meters; and 95 percent confidence of damaging an airstrip. Even if China had this many SRBMs and used them all against Taiwan's airstrips, it would shut them down for only as long as Taiwan took to repair them—a matter of hours for any one strip. Global Positioning System-guided missiles (which China might develop) could cut the number of required SRBMs in half.
 11. John Stillian and David T. Orletsky, *Airbase Vulnerability to Conventional Cruise and Ballistic Missile Attacks* (Santa Barbara, Calif.: RAND, 1999); Christopher F. Foss, "China Gets Smerch MRS Technology," *Jane's Defence Weekly*, 29 March 2000, p. 20.
 12. U.S. Defense Dept., *Annual Report*, pp. 19–20.
 13. IISS, *The Military Balance 1999–2000* (London: Oxford Univ. Press, 1999), pp. 187–8; A. D. Baker III, *The Naval Institute Guide to Combat Fleets of the World, 1998–1999: Their Ships, Aircraft, and Systems* (Annapolis, Md.: Naval Institute Press, 1998); *Jane's Fighting Ships, 1996–1997* (Coulsdon, Surrey, U.K.: Jane's Publishing Group, 1996), pp. 1122–3; and U.S. Defense Dept., *Annual Report*, p. 19. Other studies indicate that military amphibious craft could transport only one or two divisions. See, for example, Roy, p. 82.
 14. Robert Sae-Liu, "China Revives Yuting-Class Ship Programme," *Jane's Defence Weekly*, 14 June 2000, p. 37.
 15. Central Intelligence Agency, *The World Factbook, 1999*, available on the World Wide Web: <http://www.cia.gov/cia/publications/factbook/ch.html> (accessed 15 March 2001); and *Naval Institute Guide, 1998–1999*. The *World Factbook* gives the total tonnage of the Chinese merchant fleet and lists its vessels by type. This information can be used, with a conservative assumption that a vessel can carry approximately a hundred personnel per thousand deadweight tons, to calculate that 82 percent of the fleet's cargo/transport type vessels (totaling 20.3 million tons) can transport two million troops. The Naval Institute reference provides specific cases—one of them a 2,510-ton Taiwanese troop transport that carries five hundred troops, or two hundred troops per thousand deadweight tons—confirming the rough accuracy of the base assumption, since this vessel, designed to carry troops, would logically carry more than would a ship designed to haul cargo. It does not stretch belief to estimate that a cargo vessel of similar tonnage could temporarily accommodate half as many personnel on deck and in adapted cargo spaces.
 16. Hong Kong Port and Maritime Board, *Chinese Ports: 1996* (Hong Kong: Marine Department of Hong Kong Special Administrative Region, available only on the World Wide Web: <http://www.info.gov.hk/mardep/chinport/chinport.htm> (accessed 18 March 2001).
 17. Frank O. Hough [Lt. Col., USMCR], Verle E. Ludwig [Maj., USMC], and Henry I. Shaw, Jr., *Pearl Harbor to Guadalcanal, History of the U.S. Marine Corps Operations in World War II* (Washington, D.C.: GPO, 1958), pp. 23–34. A considerable number of analysts discount any capability to land troops in small civilian vessels. While the classic slab-sided, shallow-draft, bow-ramp landing craft of pre-World War II design by Andrew

Higgins is clearly superior to the standard keeled fishing craft, there is little evidence to indicate that commercial vessels would not suffice. In fact, were it not for Higgins's persistence, the U.S. Navy might well have entered World War II with what was called the "venerable fishing craft," which remained under consideration until 1936.

18. "China's military-backed industries also have entered into joint ventures with foreign firms to produce GPS receivers, which may find their way to military weapons." U.S. Defense Dept., *Annual Report*, 22 June 2000, p. 13.
19. Other innovations that might improve the effectiveness of Chinese landing forces are off-shore oil drilling platforms and unmanned aerial vehicles (UAVs). Oil platforms could be towed into the shallows around the Peng Hus and off the main island and then sunk upright, out of range of artillery. They might prove invaluable in transshipping operations; some closer in could provide firing platforms in the assault phase. UAVs returning real-time images could improve notoriously unreliable battlefield intelligence.