PANAMA CANAL

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The Panama Canal was built by the US and opened in 1914[1]. Much of the canal hardware, including the lock gates is original equipment, which is a testament to US engineering skills. As part of a treaty between the US and the Panamanian Government, US control of the Canal Zone was granted in perpetuity. The Canal Zone was a strip of land about 7 km wide on either side of the canal. Unfortunately the agreement was flawed and this was a source of friction between the parties. Therefore, in 1977 President Carter renegotiated the treaty with President Torrijos that returned ownership of the Canal Zone and the canal itself to Panama; this came into final effect in 1999.

The canal is administered by the Panama Canal Authority[2]. Contact information for the Authority can be found at http://www.pancanal.com/eng/contact/index.html.

Fig. 1. Ships in the Miraflores Locks.

[1] *Guide to the Panama Canal*, Ediciones Balboa, Panama, 2010.
[2] http://www.pancanal.com/eng/general/acp-overview.html

The canal includes three sets of locks, which enable a ship to be raised a distance of 26 m above the sea level (at either the Atlantic or Pacific entry points). Two of the sets are located at the approaches; these are the Gatun locks at the Atlantic side and the Miraflores locks at the Pacific side. The Pedro Miguel locks are close to the Miraflores locks. In between the Gatun locks and the Pedro Miguel locks lies the Gatun Lake. The canal uses fresh water, which is possible because of copious rainfall in the hills that form the central spine of Panama. (The rainy season lasts from about May to December.) For example each ship requires the release of 26 million gallons of fresh water at each lock; this eventually runs into the sea. The total length of the canal between the locks is about 45 km and there are two lanes.

The shipping capacity of the canal is limited by the width and depth of the canal and in particular at the locks. "Panamax" vessels are designed to just fit in the locks, which are presently 33.5 m in width and 330 m long. For the largest ships that can transit the canal this leaves a clearance of about 10 cm on each side. A Panamax ship can carry 4,500 containers. Presently there are about 14,000 annual transits of high-draft vessels; this corresponds to about 330 million tons of shipping. However, by 2020 projected traffic is more than double and the construction of new locks is under way. These should be completed by 2014 and enable the largest ships presently under construction to transit the canal. Such ships can carry up to 12,000 containers. The new locks will be up to 55 m in width and about 440 m in length. However, the large quantities of fresh water that will be needed would be a problem without special water conservation methods. These will rely on holding tanks to re-use the water.

The Panama Canal is an important contributor to the world economy and especially that of Panama. The toll for Panamax vessels can be up to about $300,000 US and revenue from the canal and related services is the principal driver of the Panamanian economy. The second is tourism followed by banking. The standard of living in Panama is among the highest in Latin America and the importance of the canal to Panama is reflected in their concern about security. For example, visitors to the Miraflores locks must pass through a security check and are photographed without hats or glasses. After the canal improvements, the canal will be even more important.

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