

### Stage 1: Oahu, Hawaii

Volcanic island with fringing reef  
(Photo by NASA)

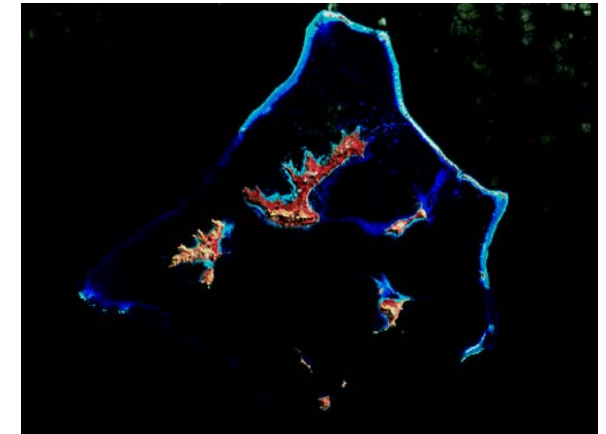


### Stage 2: Society Islands

Volcanic islands with barrier reefs  
(Photo by NASA)

The Republic of the Marshall Islands consists entirely of low-lying coral atolls, evolutionary remnants of the more commonly known and visited high volcanic islands. There are 29 separate atolls in the Marshalls, containing a total of 1,225 islands, 870 reef systems, and 160 species of coral. The Marshalls are one of only a few all-atoll nations in the world.

Scientists first became interested in coral reefs and atolls in 1837, after Charles Darwin returned from a 5-year exploratory expedition through the Pacific and Indian Oceans. Darwin postulated that after a volcanic island is created (from underwater volcanoes which shoot up masses of land to the ocean's surface), a fringing coral reef starts to develop closely around it (**See Stage 1 photo of Oahu, Hawaii**). Over millions of years, the volcanic island steadily sinks back into the ocean. Thus, the distance between the island and the fringing reef becomes larger and larger as the island recedes. Eventually, a fringing reef becomes a barrier reef



### Stage 3: Gambier Islands

Receding volcanic island within barrier reef  
(Photo by NASA)



### Stage 4: Penhryn, Cook Is

Coral atoll (Photo by NASA)

(see lower two islands in Stage 2 photo, Society Islands). Over time, what was once a high volcanic island becomes a smaller island in the middle of the lagoon (see Stage 3 photo, Gambier Islands). Ultimately, the entire island is washed away to sea with only the barrier reef outline remaining. This remaining reef outline is what we call today the coral atoll (see Stage 4 photo, Penhryn Atoll, Cook Islands).

On some coral atolls, including all of the Marshalls' atolls, long-term sedimentation has created slender islands which are inhabitable by animals and humans.

When Charles Darwin first presented his theory on island evolution to the Royal Society, he created an uproar (among both the scientific and church communities). It wouldn't be until over 100 years later, in the Marshall Islands, that Darwin's controversial theory would be proven correct.

In the mid-1940s, on the northern Marshall Island atolls of Bikini and Enewetak, U.S. Navy scientists confirmed Darwin's century-old theory after drilling deep holes into the atolls and discovering the exact same sequence of rock layers which Darwin's theory had predicted.

Darwin's early ideas on island evolution and the subsequent U.S. Navy tests on Bikini and Enewetak provided important evidence for the formulation of the current-day theory of Plate Tectonics.

#### Atoll Facts:

- The word atoll comes from the Maldivian word *atolhu*
- Atolls can only be found in tropical ocean regions, near the equator
- Coral reefs, which form the foundation of atolls, can only grow in waters with mean annual temperatures between 23 and 25 degrees Celsius.
- Other all-atoll nations, in addition to the Marshalls, include the Maldives, Kiribati, and Tuvalu.



# MIVA

Visitor Leaflets

## Coral Atolls

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