Introduction—Setting the Scene

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When Charles Darwin stepped out of one of HMS Beagle's longboats onto San Cristobal Island on September 15th 1835—a Tuesday morning—his immediate impression was that "*nothing could be less inviting*": "*A broken field of black basaltic lava, thrown into the most rugged waves, and crossed by great fissures, is everywhere covered by stunted, sun-burnt brushwood, which shows little signs of life*" (Fig. 1.1).

Very soon afterwards, however, he began to realise that amongst the "*wretched looking little weeds*' and the "*ante-diluvian*" animals, "*the natural history of these islands is eminently curious, and well deserves attention*." The rest, as they say, is history—although at times maybe even mythology…

But it was also as a geologist that Darwin had joined the crew of the Beagle near four years earlier—although in the earlier 19th century, the distinction between the various natural sciences, such as zoology, botany and geology, was often blurred within a general concept of the 'natural historian'. He was strongly influenced by the Charles Lyell's, *Principles of Geology*, first published in 1830 a copy of which was presented to him by the Beagle's captain, Robert Fitzroy at the beginning of the voyage. In a geological context, Lyells's book is often considered to be as monumental in the development of science as Darwin's iconic *Origin of Species* of 1859. Through brilliant observation, Lyell had broken away from a literal, biblical interpretation of Creation, and had concluded that by observing natural processes *at the present time*, one could interpret the features one sees preserved in the geological record, literally "*the present is the key to the past*" (Fig. 1.2).

Lyell's contention that the rocks and landscapes we see today are a result of ongoing geological processes, leading to gradual changes over vast spans of time, were clearly fundamental to Darwin's explanation of the origins of the variety of life that he observed during his voyage on the Beagle (of which the Galapagos were only *part* of the puzzle…). However, Lyell did refer to the Galapagos in several places, including as examples of islands of volcanic origin—and this no doubt would have inspired the young Darwin. As well as his much more famous collections and observations of the wildlife of the islands, Darwin also collected a suite of rocks samples—now housed in the collections of the Sedgwick Museum of the University of Cambridge, England—which informed his later reports and theories. But he was not the only rapporteur on the geology of the islands, and many references to Galapagean volcanoes are scattered through 19th century and earlier 20th century scientific literature. But as with Darwin's geological notes, much of this is submerged, almost without trace, under a vast ecological literature, characteristically picking up where Darwin left of in his observations about the origins and evolution of the island's unique flora and fauna (Fig. 1.3).

Nevertheless, without an understanding of the origins and *geological* evolution of the islands, most of these evolutionary studies lack context—indeed, as the two themes are so intimately related, any study that fails to adequately consider this context may be fundamentally flawed. However, this geological literature inhabits an almost entirely independent publication world, with suites of scientific journals dedicated to volcanology and related themes offering little opportunity for cross-over, whilst ecological and evolutionary studies, with their own journals and populist outlets, always maintain the highest profile. In this volume, however, it is our intention to redress this imbalance, and provide a modern interpretation of the origin and evolution of the islands—informed by the latest geoscience research—in a form which will remain accessible, not only to ecologists, but also to the wide range of other visitors that the islands now receive, attracted by their its iconic status.

However, with increasing numbers of visitors, there is a need to provide a greater range of activities and opportunities for visits and the spectacular geological heritage of the Galapagos Islands can provide such a resource. And crucially, as the majority of geological features are extremely robust, there is a potential to use them to reduce some of the pressure on some ecologically more sensitive sites, as part of

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Geoheritage, Geoparks and Geotourism, https://doi.org/10.1007/978-3-030-05915-6_1

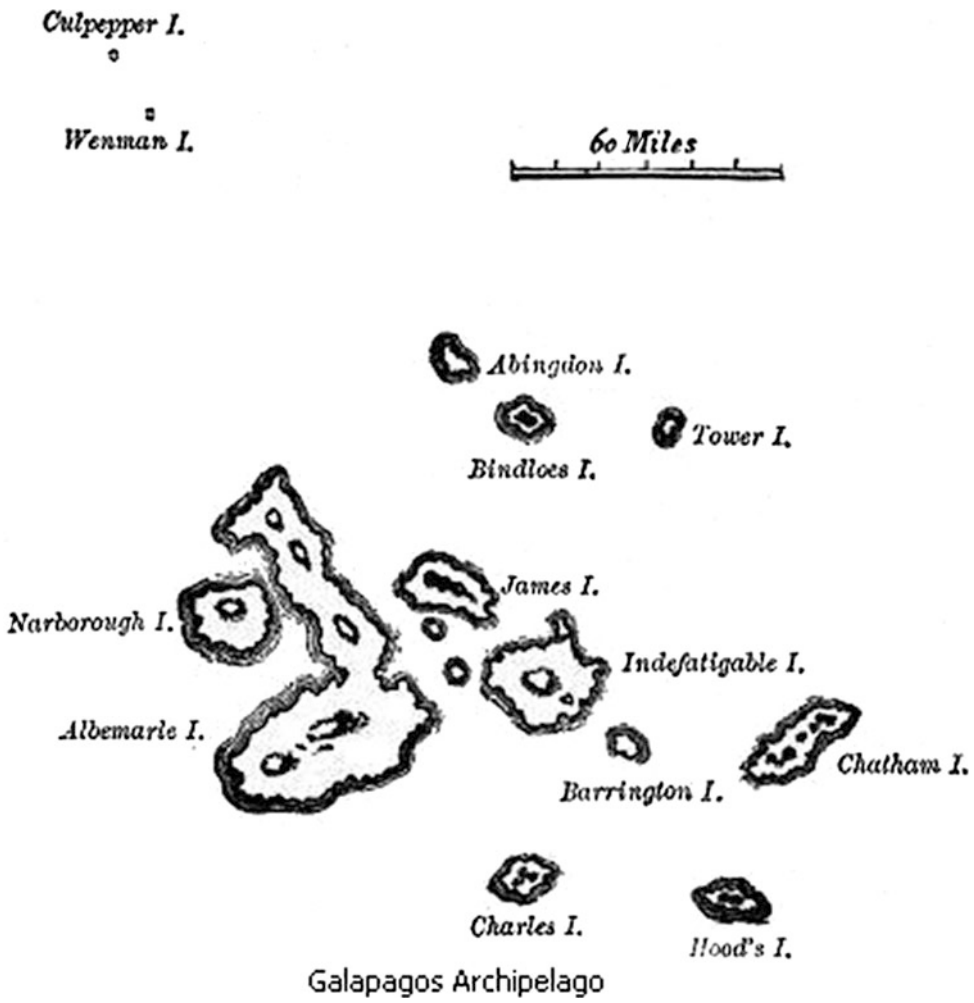

Fig. 1.1 Darwin's map of the Galapagos islands, from his *Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle*, 1835 and later editions, San Cristobal is Chatham Island

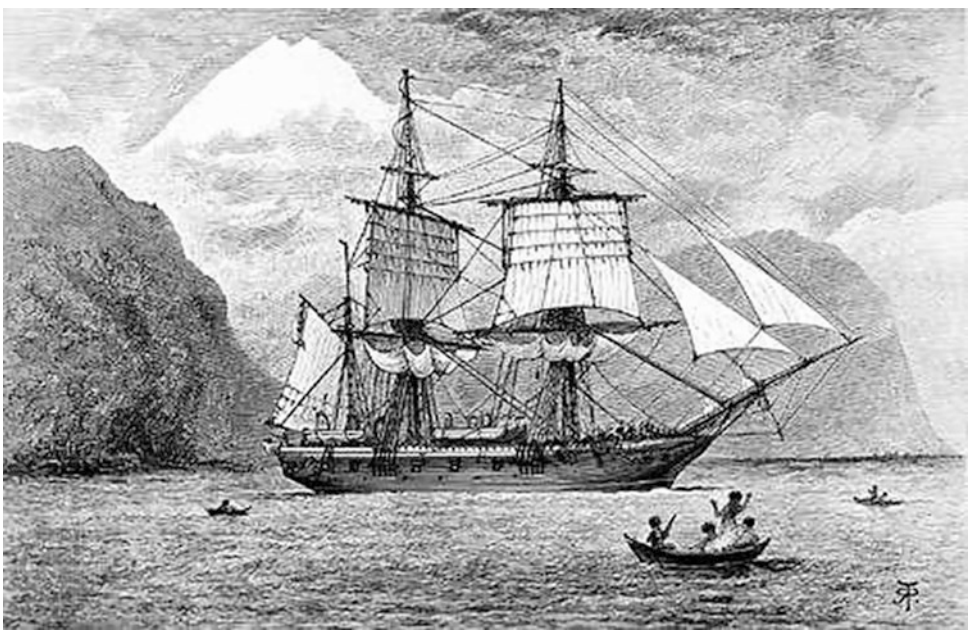

Fig. 1.2 HMS Beagle on the Strait of Magellan, South America (from the '*Journal*')

Fig. 1.3 Charles Darwin in the late 1830s—a changed man, soon after his return to England after the voyage of the Beagle (from https://commons.wikimedia.org/wiki/File:Charles_Darwin_by_G._Richmond.png)

the development of a more holistic approach to 'ecotourism' across the islands. Indeed, the whole issue of sustainability and tourism in the Galapagos has become a major theme in the published literature on the islands—now even appearing to swamp the number of evolutionary and ecological studies. A major theme within this literature is inevitably the delicate balance between tourism and conservation, with some proponents supporting increased controls and restrictions, whilst others promote a much more inclusive model that involves the island's resident population.

And this is where we see geological heritage as potentially being fundamental to future developments. Taking the highly successive model of UNESCO Global Geoparks as a framework for truly sustainable development (and with

genuine benefits for the resident population), we argue that by developing the Galapagos' potential as both a '*geo-touristic*' and '*geoeducational*' destination, one can help consolidate a different style of tourism, in which education and understanding become as important as experience and entertainment. In this context, geological sites could become as important to as ecological sites—with visitors as keen to learn about the unique and spectacularly visible geology as they are to learn about the unique ecology and its origins. To such ends, we also provide an account of all the geological features visitors to the islands are likely to experience—or alternatively, might even wish to track down!