

very costly and was partly financed by the export of wine. Although Rome shipped large quantities of wine to India, they were not enough to settle the balance of payments. The remainder had to be paid in gold and silver. The outflow of gold to India resulted in a severe economic crisis. Roman emperors could no longer finance the customary free distribution of food. Unable to pay its soldiers, Rome was no longer capable of stopping the "barbarian incursions" in the north. Ultimately, the overextended and financially strapped empire collapsed.

Just as the Mesopotamians paid a high price for their inability to adjust cultural and social achievements to the existing ecological framework, so the Romans suffered for their shortsighted exploitation of the environment. The decline and fall of the Roman Empire was the consequence of a combination of factors including intra-social forms of exploitation (slavery); military and fiscal overextension; environmental degradation, including soil erosion and deforestation; and foreign invasions. All these variables contributed to the eventual eclipse of the empire.<sup>112</sup>

Based on exploitative and stratified social-ecological relations, Rome failed to adapt its economy to the environment in sustainable ways and placed an insupportable demand on the available natural resources. Thus, Rome failed to maintain the balance with nature that is necessary to the prosperity of a human community. The empire depleted the lands of the ancient Mediterranean world, and in so doing it undermined its own ability to survive.<sup>113</sup> The Romans left succeeding civilizations a chilling monument to their ecological folly: the fertile wetlands of North Africa that once supplied the empire's granaries had turned into deserts.<sup>114</sup>

#### 4. The Chaco Anasazi, Northwestern New Mexico: 700 CE to 1300 CE

The ancient Anasazi civilization in the American southwest was a farming society that created one of the grandest regional and social political systems in prehistoric North America. "Anasazi" is a Navajo name that is usually, and romantically, translated as the "ancient ones," also "ancient strangers." A better translation, according to anthropologist team David Stuart and Susan Moczygemba-McKinsey, would be "ancestors of our enemies," a frank description of the social relationships that once prevailed between local Navajo bands and the village-dwelling farmers of the late prehistoric Southwest.<sup>115</sup> Generally, the Anasazi people lived for centuries on mesa tops. Later some of them moved to cliff dwellings with protective overhangs such as Colorado's Cliff Palace.

The earliest North American ancestors of the Anasazi were the Clovis hunters of some 10,000 to 5,000 years ago. As discussed in Chapter 1, these archaic ancestors had over-hunted the immense game animals of the later ice ages and contributed to their extinction.<sup>116</sup> The first great transformation leading to the Chaco Anasazi society occurred around 5000 BCE to 2000 BCE, when their Neolithic ancestors took up agriculture as an adaptive response to climate change, loss of big game animals, and population

growth. This newly emerging mode of livelihood was based on more work, more stored food, greater sedentariness, and accelerating changes in technology.<sup>117</sup> These early ancestors grew in numbers and their cultural forms of knowledge expanded as well. Eventually, their success created the interconnected, open community of Chaco Anasazi.

At its height in the eleventh century, the Chaco Anasazi culture dominated 40,000 square miles of a scrubby, semi-arid region roughly the size of Scotland.<sup>118</sup> Anasazi civilization consisted of 10,000 to 20,000 farming hamlets and nearly a hundred spectacular district towns, called "great houses" or "pueblos," that integrated the surrounding farmsteads through economic and religious ties. Hundreds of formal roadways linked the population areas. Chaco Canyon, now a national park in New Mexico, was both the heart and soul of this domain. At the bottom of the canyon, Anasazi people built 650-room dwellings that were five stories high, 650 feet long, and 315 feet wide, making them the largest buildings ever erected in North America, only surpassed by steel skyscrapers in the late nineteenth century. It took the Anasazi farmers more than seven centuries to lay the agricultural, organizational, and technological groundwork for the creation of a flourishing civilization that lasted about 200 years and then collapsed in a span of only a few decades.<sup>119</sup> What happened to change the landscape so dramatically? Mounting archaeological evidence points to the Anasazi culture itself.<sup>120</sup>

Archaeologists have put together a convincing case of man-made environmental disasters engineered by pueblo-dwelling Anasazi Indians 800 years ago. The Anasazi, who lived in what is now New Mexico and Arizona, built an elaborate complex of roads, irrigation channels, and five-story stone and wooden beam pueblos, some containing as many as 800 rooms. All were abruptly abandoned around 1200 CE. Originally, Chaco Canyon was covered by piñon pines and junipers. We know this from the fossilized remains of wood rat middens dated back to the period between 8000 BCE and 1200 CE. These ancient refuse heaps created by packrats living after 1200 CE have preserved an accurate historical record of a human-induced environmental disaster. The heaps contain leaves, twigs, and other odds and ends collected within a short distance of the rats' home burrows; glued together with the rats' urine and sheltered below ground from the weather, they provide a time capsule of local vegetation. The packrat heaps contain an abundance of piñon needles and juniper twigs – until 1200 CE, that is. At that point, all traces of juniper and piñon suddenly vanish.

At the peak of the Anasazi civilization, between 1075 and 1100 CE, people relied heavily on the use of timber to build their gigantic pueblos. As large portions of the surrounding area became denuded, Anasazi were forced to travel longer distances to procure timber. In addition, they cut down trees and bushes for firewood. Heavy use of timber for construction and firewood meant severe deforestation. The increase in population further placed a tremendous strain on the resources of the area. As the land could no longer

support the population. Anasazi culture collapsed, together with the ecological habitat on which it was based.<sup>121</sup> Archaeologists had long suspected that the abandonment of Chaco Canyon was the result of climatic change. More recent research, however, makes it clear that the environmental disaster that befell the Anasazi was largely self-inflicted.<sup>122</sup> The social organization of this society played a key role, ultimately facilitating the collapse.

Chaco society was stratified into two major classes: the Chaco farmhands, living in farmsteads, and Chaco elites, living in big houses or pueblos. Daily life in the great houses contrasted dramatically with the customary realm of the farmstead. For most Chaco Anasazi, the daily regime was based on hard work and few luxuries.<sup>123</sup> Elites fared much better. Studies of burial populations indicated that both great-house males and females were on average 1.8 inches (4.6 cm) taller than their small-house cousins living as close as 500 to 1,000 yards away. A child's chances of living to age 5 were a sobering three times better in a great house than in the farmsteads within sight of it.<sup>124</sup>

Until 1090, the stratified system seemed to have worked well. But Chaco society carried within its hierarchy the seeds of its own destruction. Having quickly expanded into virtually every possible farmland location after 1000 CE, Anasazi farmers soon ran out of additional farmland.<sup>125</sup> The real calamity began with a combination of drought and a shortage of farmland in the face of burgeoning population in the 1080s and 1090s. A second major drought occurring 30 years later spelled the end of the Chaco civilization. The Anasazi, as Stuart points out, were "seduced by growth and power." They overreached and Chacoan society became so fragile that events that would have sparked few consequences in the first 8,000 years of southwestern prehistory — two droughts about 30 years apart — undid it completely.<sup>126</sup> How had they become so vulnerable?

One of the decisive causes for the Chaco Anasazi collapse, according to Stuart, was the elites' power and their formulaic response to the crisis: "roads, rituals, and houses."<sup>127</sup> In a stunning but final building frenzy, the Chacoan elites erected their grandest buildings in an effort to "pump up the economy." Many hundreds of thousands of ponderosa pines had been cut to support the roofs of the canyon's proliferating great houses. Immense logs, up to 30 feet long, were carried 20 to 30 miles from outlying forests. They were also carried on formal roads constructed after 1050. About 400 miles of roadway 12 to 30 feet wide have so far been documented.<sup>128</sup>

Over-planting and over-building were clearly two distinguishing features of the Chaco Anasazi response to the crisis. But apparently the Pueblo elite also failed to realize that, without the small farmers to produce corn, their society was not viable. That point was forcefully driven home by the second drought. Stuart sees in the late eleventh-century great houses of Chaco Canyon archaeological evidence of their short-term power but the ultimate futility of psychological denial and social myopia.<sup>129</sup> It must have taken

hundreds of millions of working hours to build the great houses and the more than 400 miles of roads of Chaco Canyon. But the society depended upon the tens of thousands of working hours it took to plant farm plots that supplied the daily food, to carry water and firewood, to grind corn, to make tools and cloth and fabulous pottery to trade, as well as to produce cotton cloaks and rabbit fur and turkey feather blankets for the winter.<sup>130</sup> The Chaco did not fail because they ran short of pueblos, turquoise, or macaws, which they prized; they failed because their exaggerated growth pattern could not be sustained. In the end, they lacked sufficient water, corn, meat, and fuel to meet their increasing demands.<sup>131</sup> Heightened violence and vicious civil wars accompanied the collapse of Chaco Anasazi society between 1150 and 1200.

Ascending civilizations often create vast infrastructural networks and produce remarkable quantities of manufactured objects in a relatively short period. The social and ecological over-extension of the Chaco Anasazi was facilitated by its stratified social structure and its dependence on getting maximum results from a subsistence system: they made no allowance for long-term hazards. As anthropologists David Stuart and Susan Moczygemba-McKinsey suggest, Chaco's failure can be pinpointed in their inability to adapt to the consequences of rapid growth.<sup>132</sup> The Chaco Anasazi elites seem to have been seduced by their own power. Like many civilizations before and after, this advanced society committed a series of ecological blunders that proved to be the source of their ruin.<sup>133</sup> Over 800 years later, the woodlands of Chaco Canyon have not returned.

## 5. The Mayas, Mesoamerica: 200 CE to 900 CE

Ever since the discovery of Mayan ruins in the Honduran jungle during the mid-1800s, the remnants of this majestic civilization have lured archaeologists, anthropologists, and linguists from around the world. By 900 BCE the Mayan civilization had spread across the region we now know as Mexico's Yucatan Peninsula, Belize, and the northern half of Guatemala. Between 250 CE and 900 CE, Mayan civilization reached its zenith, producing great intellectual achievements in the arts, mathematics, and astronomy. Moreover, the Mayas evolved the only elaborate writing system native to the Americas. Without metal tools, horses, oxen, or even the wheel, they were able to construct vast cities across a huge jungle landscape with an amazing degree of architectural perfection and variety. Their massive pyramids across Central America have become modern-day monuments to their cultural legacy. Their great cities were dominated by brightly decorated royal palaces that gleamed in the tropical sun, and the grandeur of the greatest of all Mayan centers, the 123-square-kilometer metropolitan town of Tikal, rivaled that of Rome, Alexandria, and the great centers of China. Their cultural legacy has survived in spectacular fashion there and also at places like Palenque, Tulum, Chichen Itza, Copan, and Uxmal. The Mayas created elaborate and highly decorated ceremonial architecture, including temple