

SPOILED LAND

‘Spoil’ can be used as a verb or a noun and has many meanings. You can spoil a child by excessive indulgence, spoil a ballot paper by marking it improperly, plunder a nation and head home with your spoils, or dig a mine and surround it with spoil. Among the general public and in the press, new mining developments are almost always seen in a negative way, as operations that spoil landscapes irretrievably. In contrast, while we recognize that agriculture can change landscapes, the changes are usually seen as acceptable or even positive.

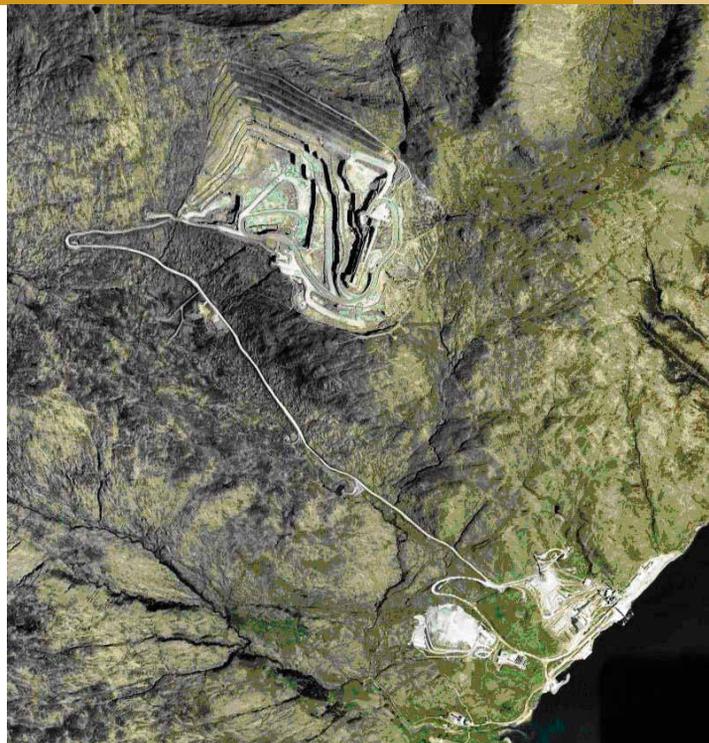
The truth is rather different. In densely populated countries, agriculture and urbanization have spoiled landscapes on scales compared to which the effects of mining are trivial. This was brought home to me on a trip to southern New Mexico when we passed the colossal El Chino porphyry copper mine, one of the largest in the world. The pit is over 400 m deep and covers 5 by 3.5 km at surface. Trucks carrying 360-tonne loads shift 439,000 tons of rock each day, of which about half is waste. It seems to represent despoliation on a gigantic scale. But, as my host, Matt Heizler, pointed out at the time, in the context of New Mexico, it is a tiny blemish. New Mexico has half the land area of France and a population of just over 2 million. Overwhelmingly, most of its immense, sunburned landscape remains truly unspoiled.



The El Chino mine, New Mexico, USA. PHOTO: MARSHMAN AT THE ENGLISH LANGUAGE WIKIPEDIA

Not so the landscape that you see when, after crossing the Atlantic, you emerge from the clouds over southern England. That landscape, intensely green, with its ancient and irregular patchwork of fields (inhabited, as we know, by Hobbits!), is totally spoiled. Not one turf is untouched by Man. The locals, however, do not see it in this way. Propose a new motorway or a housing development, and they rise up and protest that their unspoiled countryside is under threat. It is indeed very pretty, and if I lived there I might join such an uprising myself, but unspoiled it is not. The scenery of almost all of England (and much of mainland Europe) has been modified irreversibly by Man over thousands of years.

Even the least populated parts of the United Kingdom, regions that most people would consider to be ‘wild’, have been changed much by agriculture but little by mining. I am sitting in the Lochaber district of Scotland, 4648 km² in area, where the population density is 4.04 people per km², less than that of New Mexico (6.54). The starting gun for records of human activity in Lochaber was fired only 10,500 years ago when the last ice sheet melted. The oldest signs of human occupation are 9500-year-old bloodstone (chalcedony) implements and carbonized hazelnuts from the island of Rum, best known for its spectacular



Satellite image of Glensanda superquarry. The shipping facility is at the bottom right. GOOGLE EARTH IMAGE ©2011 GETMAPPING PLC

layered gabbro intrusion. Bloodstone implements from Rum are widely distributed in Mesolithic Scotland, so mining reaches right back to the end of the last glacial episode, and predates organized agriculture.

Today most of the Scottish Highlands is treeless mountains and blanket bogs, but 5000 years ago it was covered by a great mixed forest. Hardy Scots pine grew on all but the highest and steepest mountainsides, and dense oak woods lined the fjord coastlines. About 4000 years ago early farmers with grazing animals arrived. They burned and cleared forests to encourage growth of heather for their stock, and grazing in turn inhibited regeneration of the forest. By the time the Romans arrived, 50% of the great forests were gone. They reached an all-time low in the 18th century, and overgrazing by sheep and deer has ensured that the hills remain barren. Today only about 1% of the original native pine woods remains. The main industry is tourism, and while the combination of coastline and bare mountains facing out to the Western Isles is wild, dramatic and beautiful, only the hard rocks are truly natural.

So, what has been the contribution of mining to the spoiling of Lochaber? In the Iron Age, bog iron ore – iron hydroxides precipitated by bacterial action – was smelted on rough hearths using wood or charcoal. Hearths in surviving forests can be identified by expert eyes, and many have been assigned to the 13th to 16th centuries. In the early 18th century, a lead–zinc mine was opened near the village of Strontian, leading to the discovery of the element strontium (see *Elements 4*: 216) and leaving sporadic workings and isolated spoil heaps (mostly of baryte) over an area of perhaps 15 km². Today, apart from two small quarries for road metal and limestone, there are two active mining operations, one small and one very large.

A white Cretaceous sandstone is mined near the pretty coastal village of Lochaline. It is 99.8% pure quartz, one of the purest silica-sands in the world. The 12 m thick sandstone, which has undergone virtually no diagenesis, is soft, and the middle 5 m are extracted by blasting and

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Silica-sand mine, Lochaline, with the Palaeocene lavas of the Isle of Mull beyond

simple shovelling. The mine was opened in 1940, during the Second World War, to provide quartz for optical glass for gunsights and periscopes. Today, 12 men extract the sand for high-quality speciality-glass products. It is loaded directly onto small ships, there is no surface spoil, and the product is chemically as inert as any rock can be.

The other operation is much larger. The Glensanda superquarry is cut into granite near the west shore of Loch Linnhe, the deep fjord that follows the line of the Great Glen transcurrent fault, a terrane boundary that runs SW–NE across the Highlands. It is the largest granite quarry in Europe and began operation in 1986 when the first load of granite was shipped to Houston, Texas. Since then, 120,000,000 tonnes of crushed granite have been shipped to many destinations. It was used during

building of the Channel Tunnel, and recently a record single load of 93,665 tonnes was sent in one of the quarry's dedicated self-unloading ships to Rotterdam, where it is being used in a major port extension.

Remarkably, this massive quarry and its loading facility are almost invisible from any road or inhabited place. You can spot them from certain viewpoints, and there are complaints about distant light pollution during our 18-hour winter nights, but the uninformed holiday visitor will be unaware of their presence. Glensanda cannot be reached by road, and a walk-in is a 30 km round trip. The 160-strong workforce comes and goes by sea. The trick used to minimise visual impact was to site the quarry 2 km inland and 500 m above sea level. Blasting brings down about 70,000 tonnes of granite per bang, and this is transported by truck to a crusher in which it is reduced to 20 cm pieces. It is then carried by conveyor to the Glory Hole, a 300 m vertical shaft 3 m in diameter, which is permanently full of crushed fragments. Deep inside the mountain, these are transferred to a horizontal conveyor, moved through a 1.6 km tunnel to a second crusher and loaded onto ocean-going ships at the rate of 6000 tonnes per hour.

So, who has spoiled Lochaber the most? Late Neolithic Man, the first agriculturalists, or Modern Man with his insatiable demand for raw materials? By a large margin it is our forebears of 4000 years ago.

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PARTING QUOTE

In science the credit goes to the man who convinces the world, not to the man to whom the idea first occurs.

FRANCIS DARWIN 1848–1925

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