

HUMAN IMPACTS

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Prehistoric Man

Man's impact on Europe has been profound and pervasive. Europe, with its diverse landscapes and climatic conditions, its abundance of metal ores and energy minerals such as coal, oil and gas, its rich resources of pure and abundant surface and underground waters and its prolific vegetation and wildlife, has shaped our cultural and technological development over a very long time.

The oldest documented sites of early human occupation are at Isernia in central Italy and dated at 730,000 years old while others in Italy, France, Germany, England and Spain in the age range 400,000 to 450,000 years old confirm that our ancestors had ventured northwards during interglacial episodes in the Pleistocene Ice Age. These communities were displaced southwards in search of food during successive advances of the Ice and as the climatic/vegetation zones migrated in sympathy.

Modern humans (*Homo sapiens sapiens*) arrived in Europe some 35,000-40,000 years ago. The celebrated cave paintings at Lascaux in

southern France date from 17,000 years ago when the last advance of the continental ice reached its greatest extent and an ice-front extended from Ireland to Siberia. South of this front, a treeless tundra extended to the Alps. In winter this would have been a bleak and barren landscape of braided rivers and outwash melt deposits flowing outwards from the ice-front. In summer grasslands would have become established on the rich loess soils and these steppes supported huge herds of reindeer, bison and mammoth. Extensive forests existed south of the Alps. Hunter-gatherer communities thrived on the abundant wildlife and continually refined their hunting weaponry and tools by exploring for new sources of earth materials and metals (basalt, limestone, flint, copper, tin, gold, *etc*). Following the final retreat of the European ice sheet about 10,000 years ago, humans spread northwards in increasing numbers to colonize the pristine landscapes vacated by the ice in search of food, shelter and adventure.

Population Growth

As the world climate warmed, the first human settlements began to develop with the advent of agriculture in the Middle East some 10,000 years ago. Domestication of plants and animals seems to have been in response to depletion of wildlife through hunting, and was accompanied by population growth. Domestication of animals like sheep, goats, pigs and aurochs (ancient cattle) meant that humans did not have to rely on wild game as a food source. Agriculture spread into Europe between 9,000 and 6,000 years ago, bringing with it the typical crops and domesticated animals from the Middle Eastern source region. Agriculture offered the possibility to feed a growing population more efficiently but the disadvantage was that the communities dedicated to its use were confined to specific

geographic areas where fertile loess-rich soils were found in the valleys of Europe (*e.g.* Danube valley). These communities had to clear the land of indigenous forests at the outset and most of their time was later spent tending the land and their animals in order just to survive. Such communities became totally dependent on successful crop cultivation. There were many disasters and crop failures due to soil exhaustion forcing the communities to clear new land for fresh crops. Flint mining flourished 6,500 years ago to support land clearance using flint axes. Unsustainable development had arrived in Europe and deforestation had begun.

As the population continued to grow, our natural desire to raise our standard of living and quality of life and our social and cultural

development meant that consumption of natural resources increased. Wood was used as a fuel and for construction purposes; forests were further depleted. Certain species of wildlife were hunted to extinction. Water was used to irrigate land. Stone was quarried for tools and the construction of burial chambers and monuments. Metals such as copper and tin were discovered, smelted and refined for weapons and precious metals such as gold and silver were widely sought and used to create wonderful artefacts and jewellery for those of high social standing in their communities.

Agriculture remained the mainstay to support population growth. But by Medieval time Europe

had a population of about 80 million people and its agriculture could not cope. Famine and disease took hold and the Bubonic Plague was spread by the fleas of black rats in the cities and towns of central Europe from about 1346 onwards; the pandemic led to a catastrophic death toll and nearly half the population was wiped out. The population recovered gradually as the brown rat supplanted the black rat in cities; brown rats were a less efficient vector for the disease.

Today, in the 26 countries covered by our Atlas, a population of approximately 520 million people occupy an area of about 4.5 million square kilometres.

Land Use

Agriculture

The burgeoning population needed more and more land for productive agricultural use and methods of increasing productivity were sought. Gradually, it became apparent that agricultural soils needed additions of organic matter and nutrients such as nitrogen, potash and phosphate in order to remain fertile and productive. Although mechanisation had increased productivity greatly in the last century, intensive farming brought with it a plethora of environmental problems and soil impacts including desertification, erosion, salinisation, compaction and pollution (Figure 1). Over-application of chemical fertilisers led to accumulation of nitrates and phosphates in soils and in runoff to rivers and lakes where eutrophication and fish kills have occurred. The



Figure 1. Agriculture creates demands on soils and ecosystems. (<http://newsbbc.co.uk/2/hi/science/nature/417601.stmH>)

spreading of waste sludges on land has led to accumulation of heavy metals such as lead, cadmium, copper and zinc in the surface soil layers. The use of organic herbicides and pesticides to control plant diseases which inhibit productivity has led to accumulation of poisonous residues in soils, surface water and transfer to groundwater.

Urbanisation

The growth of European cities and towns has continued over the millenia from their early origins in the Aegean region. Today, over 65% of Europeans live in urban areas. The construction of cities, towns and the road and rail networks that connect them has demanded the mining and quarrying of a huge volume of earth materials (aggregates, dimension stone, industrial minerals, metals etc), often over a period of centuries to sustain the urban sprawl of major conurbations (Figure 2). These mines and quarries have left their own legacy of soil and water pollution and landscape degradation

The cities and towns themselves contribute to pervasive air and water pollution through waste products of human activity, industry and transport. Gaseous emissions of carbon dioxide, carbon monoxide, sulphur dioxide, nitric oxide, phosphates and lead are produced extensively in urban areas and contribute greatly to the Greenhouse Effect, the acidification of soils and lakes (“acid rain” phenomenon) and to significant human health problems.

Cities generate significant quantities of waste water from domestic and industrial sources. In the



Figure 2. Transport systems and infrastructure create major environmental impacts (<http://www.rightlanemedia.com/taxicabs.html>).

intensively industrialised areas of Europe (e.g. Rhine valley, Ruhr valley, Poland, Czech Republic, South Wales etc) the historic discharge of metal-polluted waters to major rivers and lakes has resulted in serious degradation of their water quality and the near elimination of aquatic biota.

Cities generate huge quantities of domestic and industrial waste which have to be buried in landfill sites, incinerated or treated chemically. Dumping practices in the past have led to pollution of soils, streams and groundwater with a variety of chemical and biological contaminants including organic compounds and pathogens.

Energy Consumption

Industrialisation and urbanisation in Europe has led to an unprecedented and rapid demand for energy minerals such as coal, oil, gas and the radioactive ores of uranium and thorium to generate electricity in thermal power stations.

The underground and open-pit extraction of fossil fuels such as coal, lignite and peat and their burning in power stations to generate electricity over the past century or more in industrialised countries such as Britain, Germany, Poland etc has led to catastrophic and widespread pollution in specific areas due to emissions of carbon dioxide, sulphur dioxide, fly ash dust and heavy metals. Respiratory problems among inhabitants of these areas are endemic and the landscape has been degraded to an appalling degree, particularly where large-scale open-cast mining was carried out. Soil and water pollution have been pervasive. There has been a pronounced move from coal to oil and natural gas as cleaner energy sources in

Industry

The Industrial Revolution of the 18th Century brought about huge environmental impact in Europe. The utilisation of coal to generate energy, the invention of the steam engine and later the internal combustion engine, and the resulting proliferation of mechanisation led to greater and greater productivity across all of industry which was further accelerated by two global wars in the 20th Century. The residues, effluents and emissions of the metal and coal mining industry, of smelting and refining works, of cement production plants, of milling and brewing plants, of chemical and pharmaceutical manufacturing plants, of glass and ceramics factories, of tanneries and textile plants, of car manufacturing plants *etc.* have all been added to the air, soil and waters of Europe in increasing amounts over a prolonged period. Europe, along with other industrialised countries, consumes 80% of world production of metals like aluminium, chromium, cobalt, copper, iron, manganese, nickel, platinum, steel, tin, tungsten, zinc and lead. Today, the major cities of Europe and their industrial hinterlands are peppered with “brownfield” sites contaminated by diverse previous and ongoing industrial activity and which now necessitate remediation and reinstatement to productive use.

the past 30 years, though not in EU Accession countries such as Poland, the Czech Republic and East Germany.

The direct combustion of fuel oil for the generation of electricity has similar impacts, albeit diminished, to those of coal. The primary source of pollution by oil is through its combustion in automobile and truck engines with emission of hydrocarbons, sulphur oxides, nitrogen oxides and lead to the atmosphere. The introduction of unleaded petrol and catalytic converters in automobiles and the increased use of diesel oil for trucks are a direct response to public health concerns and the need for lowered statutory emissions from such vehicles (Figure 3).

Nuclear energy is now the largest source of electricity in Western Europe today and four countries (France, Belgium, Hungary and Sweden) generate over half of their electricity by this means. However, countries like Ireland,



Figure 3. Power generation has environmental implications (<http://www.vcapcd.org/apcdoac/health/villains.shtml>).

Portugal, Denmark, Greece, Austria and Norway have never embraced nuclear power. For its advocates, nuclear power offered the possibility of environmentally clean energy, notwithstanding the complexity and longevity of the problems posed by nuclear waste disposal.

However, the Three Mile Island accident in Pennsylvania in 1979 and especially the Chernobyl accident in 1986 in the Ukraine have changed public opinion forever about the safety of this industry and brought home the realisation that there are wide-ranging and long term catastrophic consequences of human error or terrorist attack at such installations. It is estimated that hundreds of thousands of children living in the contaminated areas of the Ukraine, Belarus and Russia may be at risk of developing thyroid cancers and leukemia. The net economic cost of the accident could be immense. As the radioactive plume spread across Europe, fallout of radioactive isotopes such as caesium-137, strontium-90 and plutonium occurred in rainfall and contaminated vegetation in many countries with consequent agricultural losses.

Nevertheless, the increasing demand for energy by the growing economies of Europe will ensure that nuclear power will continue to provide a substantial portion of that energy until more economic and environmentally safe alternatives are developed and brought into production.

References and Further Reading

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