CHAPTER 1

Introduction: Ruined Landscapes and the Question of Desertification

> Can this be Greece? we asked ourselves. Can it be that Attica is so utterly barren? The waves of a sparkling sea lapped against a beachless shore of pale grey limestone, as treeless and bare as the Pyramids. At the top of the cliffs there stood out, white and clear against the cloudless sky, an exquisite group of marble columns, a ruined shrine of the God of the Sea. . . .
> Can it be that Attica was always thus? In the days of Pericles were its hills so barren, its soil so thin, and its population, outside the city, so scanty as now? In those days was the bed of the Ilissos river dry most of the year? Would the old Greek writers have spoken as they did of the famous grove of the Akademe, where the greatest of philosophers walked and talked beside the Kephissos river, if then, as now, the stream had been exhausted by irrigation before reaching the sea . . .?[1]

> Historians usually include the natural world in their narratives by making it into an artefact, by drawing it within the sphere of human influence and diminishing its natural dimensions.[2]

THE RUINED LANDSCAPE

Nicolas Poussin (1594–1665) was a French painter who spent much of his life in Rome, but never went further into the Mediterranean. His favourite subjects were from Greek mythology, the ancient Hebrews and early Christianity. Like other artists of his time, he set all these in the environments he knew. The Greece of Orion or Achilles, Phocion's Athens, St John's Patmos and even St Jerome's north Africa are minutely depicted as if they were France or middle Italy (Fig. 1.1).

This is the first strand in the theory of the Ruined Landscape or Lost Eden. Renaissance poets and Baroque painters encouraged the belief that the actions of Antiquity took place in lands not too unlike the lush riversides of Normandy or the dramatic wooded badlands of the Papal States. Virgil, their inspirer, had not distinguished harsh Greece from idyllic Italy.[3] When travellers reached the drier and remoter parts of the Mediterranean and compared what they saw with what they expected, they inferred that the landscape had gone to the bad since Classical times.

A second strand comes from the idea that floods are abnormal (rather than extremes of normal behaviour) and that forests, and only forests, prevent them. This apparently comes from Giuseppe Paulini, an elder contemporary of Poussin in Venice. His report on the Venetian Alps in 1608 says that, in ancient times,

> both mountains and valleys were full of trees . . . the rains, falling upon these woods, were soon dispersed, and all the water descending directly was almost wholly absorbed by the dead leaves and by the ground itself . . . the snows lying in the shadow of the woods were but gradually liquefied, losing themselves in the soil . . .

whereas now, the mountains having been 'ruined and despoiled of their clothing' by occupational burning and other causes, the rivers rise, 'break the dikes', sweep away buildings and threaten to fill the Lagoon of Venice with debris.[4]

A third strand comes from the fathers of plant physiology. John Woodward (1699) and Stephen Hales (1727) had measured the large quantities of water vapour released into the atmosphere by plants and trees.[5] It became generally accepted that trees increase rainfall by adding moisture to the atmosphere, and that destroying trees decreases rainfall. This idea took hold on colonial and imperial British administrators[6] and was brought back to Europe.

A fourth set of ideas came from the effects of European discovery on remote islands such as Madeira and St Helena. Most of these had never had human or even mammalian inhabitants, and were volcanic; the coming of people, goats and pigs brought disaster to their plants, animals and soils. It was easy to suppose that Mediterranean coasts and islands had suffered a similar fate in the distant past to that of these

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[1] Lecture by E. Huntington, 1910.

[2] T. Griffiths, 'Secrets of the forest: writing environmental history', *Australia's Ever-Changing Forests II*, ed. J. Dargavel & S. Feay, Centre for Resource & Environmental Studies, Australian National University, Canberra, 1993, pp. 47–50.

[3] 'Virgil's Arcadia is ruled by tender feeling . . . Herdsmen lack the crudeness of the peasant life as well as the over-sophistication of the city. In their rural idyll the peaceful calm of the leisurely evening hours stands out more clearly than the labour of their daily bread, the cool shade is more real than the the harshness of the elements, and the soft turf by the brook plays a larger role than the wild mountain crags'. Bruno Snell, *The Discovery of the Mind*, Blackwell, Oxford, 1953, p. 288.

[4] Quoted in Kittredge 1948, pp. 6 ff, and in excerpts by Perlin 1989, pp. 154 ff. We have not seen the original and cannot vouch for the translation.

[5] J. Woodward, 'Some thoughts and experiments concerning vegetation', *Philosophical Transactions of the Royal Society* 21, 1699, pp. 193–227; S. Hales, *Vegetable Staticks*, Innys & Woodward, London, 1727.

[6] K. Thompson, 'Forests and climatic change in America: some early views', *Climatic Change* 3, 1980, pp. 47–64; R. H. Grove 1995.

Fig. 1.1. *Landscape with the Ashes of Phocion Collected by his Widow,* by Nicolas Poussin, painted in France in 1648 after his return from Rome. The scene is supposed to be Megara, between Athens and Corinth, in 318 BC.

fragile, unstable oceanic islands in the recent past.

From these four strands the theory of the Ruined Landscape or Lost Eden was woven. Well into historic times Mediterranean lands had been covered with magnificent forests of tall trees: the sort of forests that modern foresters are trained to approve of. Men cut down the forests to make houses or ships or charcoal. The trees failed to grow again, and multitudes of goats devoured the remains. Trees, unlike other vegetation, have a magic power of retaining soil. The trees gone, the soil washed away into the sea or the plains. The land became 'barren', and even the climate got more arid.

Desertification already existed in the fourteenth century in the hellish imagination of Dante:

> In mid-sea sits a waste land . . . which is called Crete, under whose king the world was once innocent. A mountain is there which once was happy with water and leaves, which is called Ida; now it is a desert like an obsolete thing.[7]

As a scientific idea it apparently germinated in mid-eighteenth-century writings claiming that the unstable mountains of Provence were turning into desert (p. 241). It is full-grown in the writings of Sonnini, the French traveller of 1777–8, especially about Cyprus, which became the type example of Ruined Landscape. It was popularized by the Abbé Barthélemy in his best-selling reconstructions of Ancient Greece, wherein heroes spear the boar in noble forests and

7 Dante Alighieri, *Inferno*, xiv, 94–9.

nymphs swim in crystal fountains, as if they were in Marie-Antoinette's France.[8] Travellers, comparing this with the tangled prickly-oaks and dribbling springs of eighteenth-century Greece, would find the Sonnini theory irresistible, especially if they did not know the country well enough to find the noble forests and crystal fountains that still existed.

An essential part of Ruined Landscape theory is that ruination is cumulative. Damage done in the age of railways was added to that done by Ottoman Turks, Venetians, Arabs and Romans. It is increased by war and misgovernment, especially under political regimes ('excesses of luxury and disorder') of which the author disapproves. Recovery can be achieved only with difficulty, by deliberate and enlightened human intervention.

The 'degradationist hypothesis' went from strength to strength, especially through the great authority of George Perkins Marsh. He was in Italy when most evils, from hail to frost to malaria, were blamed on the supposed destruction of forests. In 1864 he held up 'the fairest and fruitfulest provinces of the Roman Empire' as an example of the 'sterility and physical decrepitude' brought about by 'civil and ecclesiastical tyranny and misrule'.[9] The British took over Cyprus in 1878 partly because they thought they knew better than the Cypriots how to manage the island.[10]

Today, writers on political ecology feel obliged to cite the 'typical' Mediterranean landscape as an example of 'massive ecological degradation'. Scrub and scattered trees are interpreted, without evidence, as 'the debased forms of the forest'.[11] Sir Arthur Evans solemnly stated that the men of Knossós, Crete, took to using gypsum for door- and window-frames because even in the Bronze Age they had run out of trees.[12] We may smile at such naïvety, but within the last ten years scholars have glibly attributed everything from erosion to the decline and fall of the Roman Empire to shortage of trees, without demonstrating either that trees *were* diminishing or that there was no alternative explanation.

Others hold a more scientific version of the myth. Up to the Neolithic, human activity was negligible and effects on vegetation, soils or erosion are attributable to climatic change. From the Neolithic onwards, climate stopped changing and such effects 'must be' due to human action.

One school of environmental determinism claims that wide areas are depopulated, not because people have found better jobs elsewhere, but because the soils and vegetation are no longer usable. This has been most recently expounded by J. R. McNeill.[13] Huge and costly schemes of deliberate, enlightened intervention are intended to halt or reverse these changes and to 'restore' supposedly degraded landscapes. Tree-planting is often – always in Spain – presented as 'reforestation', in some sense restoring a tree cover that is thought once to have existed and is now missing. (This flatters the vanity of governments, who like to be told they can command even the very trees to grow or not to grow.)

In 1985 the British Broadcasting Corporation Natural History Unit consulted one of us about a television programme on Mediterranean ecological history. They outlined the theory as given above, and asked if we could provide examples of landscapes to illustrate it. We replied that we could, but that the reality was far more complex and we would also provide examples of opposite changes. We heard no more from the BBC, but the programme duly appeared and was a splendid exemplification of Ruined Landscape theory.[14]

Science and the Age of Enlightenment

The climatic part of the theory is a classic story of the Age of Reason. Woodward had said in 1697:

> This so continual an *Emission* and *Detachment* of *Water,* in so great *Plenty* from the *Parts* of *Plants,* affords a manifest reason why *Countries* that *abound* with *Trees* and the *larger Vegetables* especially, should be very obnoxious [that is, exposed] to *Damps,* great *Humidity* in the *Air,* and more frequent *Rains,* than *others* that are more *open* and *free.* The great *Moisture* in the *Air,* was a mighty inconvenience and *annoyance* to those who first settled in *America;* which at that time was much over-grown with *Woods* and *Groves.* But as *these* were burnt and *destroyed* to make way for *Habitation* and *Culture* of the *Earth,* the *Air* mended and *cleared* up apace: changing into a Temper much more *dry* and *serene* than before.[15]

This modest speculation hardened into a scientific principle which nobody thought of denying.[16] That human actions could affect even the climate was a powerful idea in an age which knew nothing of long-term natural changes as an alternative explanation. It was invoked in France to account for 'the year without a summer', 1816, which provoked 'the last great subsistence crisis in the western world', the repeated crop failure the following year and the frosting of the olives in 1819 and 1820. The Ministry of the Interior in 1821 commanded the Académie Royale des Sciences to find reasons for the storms and crop failures, especially to study the part played by the deforestation supposed to have happened over the preceding three decades.[17] (We now know that the real cause was 'nuclear winter' resulting from the eruption of the volcano Tambora, half a world away.)

This climate theory was believed in North America until the 1920s.[18] Even in 1914 deforestation was assumed in West Africa in order to account for an apparent decline of rainfall.

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[8] C. S. Sonnini, *Voyage en Grèce et en Turquie fait par ordre de Louis XVI*, Paris, 1801; J. J. Barthélemy, *Voyage du jeune Anacharsis en Grèce*, Debure, Paris, 1788.

[9] Marsh 1864, chap. 1. Marsh, however, was sceptical of the effect of forest on rainfall. For the higher flights of 'desiccationist' fancy, read R. H. Grove, *Ecology, Climate, and Empire*, White Horse Press, Knapwell, 1997.

[10] Thirgood 1987.

[11] For example, Braudel 1972–3, p. 239.

[12] A. Evans, *Palace of Minos*, Macmillan, New York, 1921–, vol. 2, p. 565.

[13] McNeill 1992.

[14] *The First Eden: the Mediterranean world and man*, BBC Enterprises, London, 1985.

[15] See note 5.

[16] R. H. Grove 1995. The belief that loss of trees diminishes rainfall is often attributed to Theophrastus, but we can find no passage where he says so.

[17] J. D. Post, *The Last Great Subsistence Crisis in the Western World*, Baltimore, 1977; V. Bainville & P. Ladoy, 'Préoccupations environmentales au début du XIXe siècle', *La Météorologie* 8, 1995, pp. 88 ff.

[18] And in some quarters even later: Saberwal 1998.

But confidence was decreasing: Huntington, having written eloquently of the apparent desertification of Greece, rejected deforestation as a cause, on the strength of American counter-evidence.[19] All this time the meagre original evidence had never been verified by adequate observation, and as far as we know it still never has been. If the effect exists it is evidently very small and difficult to detect among the natural fluctuations of rainfall.[20] There are abundant stories of rainfall increasing after trees have been planted, or decreasing after they have been felled. There are abundant stories of the opposite happening,[21] resulting in the counter-theory that 'rain follows the plow', a belief that lured generations of American and Australian frontiersmen to ruin (p. 120).

This is an example of a repeatable pattern which we shall encounter again. A scientist announces a theory that holds out grave threats or bright promises for mankind. This becomes popularly believed, and commands the attention of governments, who try to make their subjects behave accordingly. The theory develops a life of its own, and it does not greatly matter whether its scientific basis is sound or unsound. This pattern of popular belief and government action based on unconfirmed science or pseudo-science, characteristic of the Age of Enlightenment, gained yet more strength in the twentieth century (a fine rich example is filling the front pages of Europe's newspapers even as we write).

The Mediterranean region is slowly contracting as the African continental plate burrows under Europe. Mountain building is still in progress; great earthquakes occur every few decades. There are many volcanoes in Italy and the Aegean, with frequent minor eruptions and rare major explosions. California and Chile are likewise precariously placed at the active margins of tectonic plates. The Cape of Good Hope and SW Australia are geologically much older (parts of Gondwanaland) and more stable.

The Mediterranean is characterized by its plants. Among crops, the olive is almost confined to the region; its cold-tolerance is often thought of as defining the limit of Mediterranean climate. Wild plants have strong affinities with middle Europe and SW Asia, and to a lesser extent with Africa. They are unlike those of other mediterraneoid regions (p. 47).

Southern Europe is a region of dramatic variety and glamorous contrast. The great forests of the toe of Italy, with their deceptively Central European appearance, are utterly unlike the burning hills of Sicily, 250 km away. Crete, a splinter of land 250 by 50 km, is a miniature continent with its Alps, its deserts and jungles, its arctic wastes and its tropical gorges, where an afternoon's walk goes from something looking like Wales to a rough equivalent of Morocco. The first objection to Ruined Landscape theory is that it is too generalized. To prove the theory for one side of a mountain does not prove it for the other side (Figs. 1.3, 1.4).

THE MEDITERRANEAN

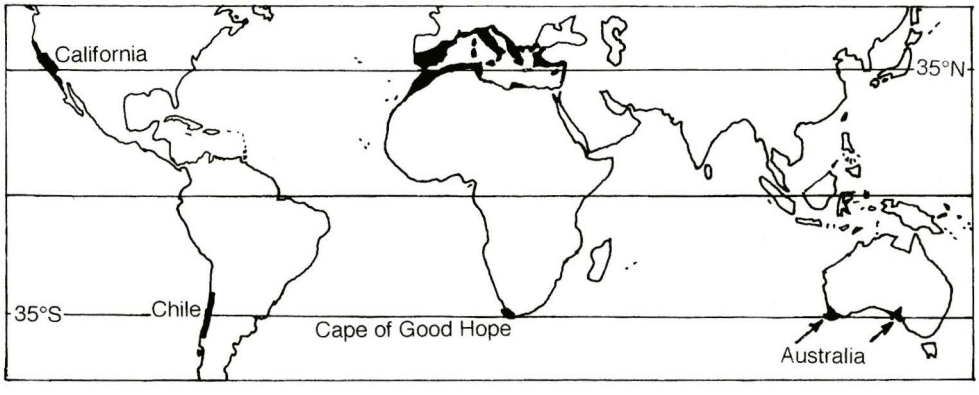

Fig. 1.2. The Mediterranean and the mediterraneoids.

Mediterranean Europe (including south Portugal) is defined by its climate: its warm wet winters and hot dry summers. Winter and spring are the growing season at low altitudes. This regime is confined to about 1 per cent of the earth's land surface, in the six 'mediterraneoid' parts of the world: the Mediterranean (by far the largest, including its Asian and African parts), California, middle Chile, the Cape of Good Hope, south-west Australia and around Adelaide in South Australia (Fig. 1.2). Almost everywhere else has rain either in the hot season or all round the year.

Diversity extends to the inhabitants as well as the environment. Mediterranean plants are often very localized. The cork-oaks of the west Mediterranean, holm-oaks of the middle and prickly-oaks of the east, with their different properties, set the character of their respective landscapes. The animal history of the islands is very unlike the mainland. Human tribes and cultures of extraordinary diversity have created different cultural landscapes out of apparently similar environments: for example, fiercely individualistic Corsica *versus* collectivist Sardinia.

[19] Kittredge 1948, chap. 10; J. Fairhead & M. Leach, 'Reading forest history backwards: the interaction of policy and land use in Guinea's forest-savanna mosaic, 1893–1993', *E & H* 1, 1995, pp. 55–91; Huntington 1910, p. 659.

[20] One undoubted effect is that trees comb droplets out of fog and thereby increase their water supply, presumably at the expense of neighbouring vegetation. This may be significant for savanna trees (p. 199) and for small 'cloud forests' on the tops of island mountains, such as the otherwise arid Asteroúsia in Crete. See Kittredge 1948, chap. 12.

[21] For an early example, Gollut in 1592 blamed deforestation in the Dôle area of France (iron-founders consuming trees faster than they could grow) for increased rainfall in the previous 26 years. Quoted in Braudel 1966.

	Mediterranean	*California*	*Mid Chile*	*Cape of Good Hope*	*SW Australia*
Area, thousands of sq. km (very approximate)	Europe 750 Asia 150 Africa 200 total 1100	250	70	40	350 (incl. S. Australia)
Latitude	31–45°N	28–44°N	29–40°S	32–35°S	28–37°S
Strength of dry season	+++	++++	++++	+++	++
Tectonics	++++	++++	++++	+	+
Proportion of limestone	++++	+	+	++	+
Soil fertility	+++	+++	+++	+	0
Erosion	+++	+++	+++	+	+
Importance of fire	+++	++++	++	++++	+++++
European settlement history, years	8000	200	450	350	160

Table 1.i. Comparison between the Mediterranean and other regions with a mediterraneoid climate.

Fig. 1.3. The diversity of Mediterranean landscapes: Manouratómylos in Amári district, with the great mountain Psilorítis. *April 1988*

At this point most authors would introduce the Mediterranean 'Triad' of crops: wheat, grapes, olives, barley.[22] These (plus the oft-forgotten legumes) are often held to define Mediterranean agriculture; but they are not present everywhere. The olive may be absent, either because of cold winters or (as apparently in much of Sardinia) for cultural reasons. The Mediterranean is, or has been, full of specializations: sugar-boilers in Motril, acorn-eaters in Estremadura, pig-driers in the Alpujarra, esparto-twisters in SE Spain, palmists in the city of Elx, madder-growers in Provence, cork-cutters in Sardinia, boar-hunters and chestnut-millers in the Apennines, oat-growers on the Macedonian serpentine, cotton-pickers in Bœotia and (formerly) Crete, resin-tappers in Attica, quail-gatherers in the Máni, banana-men in Arvi, ladanum-whippers in one particular spot in north Crete, potatoists in the Lassíthi Plain, distillers of lemon leaves in the Cyclades, shipbuilders in remote nooks of the Aegean, masticators in the southern third of Chios, spongers in the Twelve Islands. With all these local practices and many more, the Mediterranean is no place for facile generalization.

Mediterranean agriculture involves hard work but seldom unrelenting toil; most crops involve weeks of dawn-to-dusk work followed by weeks with little to do. This encourages people to create second jobs, like the merchants and fur-traders of the Píndhos Mountains. The menfolk of remote Kárpathos, renowned stone-masons, used to spend months away from the island building cities like Athens; they now spend years in the Kárpathos colony in New Jersey.

LANDSCAPE

We use 'landscape' in its century-old sense of 'a tract of land with its distinguishing characteristics and features, especially considered as a product of modifying or shaping processes and agents . . .'[23] Landscape is meant as an objective reality, amenable to scientific investigation: gorges, terraces, hedges, pollard trees originated and developed at times and by processes that can be ascertained by observation and analysis. Different observers should, in principle, get approximations to the same answer. People's attitudes to landscape or recognition of landscapes are not our main study: important though they are, they are for more advanced books than this. There is little point in studying them without first ascertaining what it is that people are attitudinizing about.

Nearly all questions of landscape have a historical component, and cannot be understood merely in terms of the

Fig. 1.4a. The desert . . .

Fig. 1.4b. . . . and the jungle.

South and north faces of Mount Kryonerítis, SW Crete *July 1981, April 1988*

[22] A. Sarpaki, 'The palaeoethnobotanical approach: the Mediterranean Triad or is it a quartet?', Wells 1992, pp. 61–76.

[23] *Oxford English Dictionary*, 2nd edn.

present situation. There are four kinds of historical investigation:

(1) Recognising sites and objects of particular importance for their long or unrepeatable processes of development, e.g. savannas with ancient trees.

(2) Understanding what human activities have gone to making a site what it is.

(3) Differentiating changes and problems that are still going on from those due to past events.

(4) Determining the normal dynamics of a site, and thereby defining abnormal processes which lie outside those dynamics. For example, floods may be normal but rare events; absence of burning may be abnormal.

The history of landscape is not the same as that of land-use, nor of country-folk, still less is it only economic history. Most landscapes are produced by human cultures interacting with the natural environment and with plants and animals. They are not necessarily the product of the most recent human culture on the site, nor do all landscape details change with every change of economy and land-use. A twentieth-century person may live in a fourteenth-century house and cultivate fields laid out in the Bronze Age.[24]

Each successive culture keeps some features of its predecessors' landscape, destroys some, abandons some and adds features of its own. Most of the major forest areas in southern Europe in Roman times were still there in the nineteenth century; changes took the form of local subtractions and additions; the complete conversion of wide areas of non-forest to forest, or *vice versa,* was unusual. Property boundaries, roads, canals and even individual olive-trees pass from one culture to another. This is obvious with planned field-systems. Great areas of north Italy still bear the rigid stamp of Roman country planning. Medieval cultivation strips are very visible in Sardinia. Half the Lassíthi Plain in Crete is today divided, as in the sixteenth century, into 193 nearly rectangular compartments, apparently a Venetian imitation of Roman practice.

DESERTIFICATION

Debate about Mediterranean ecology is haunted by memories – real or imagined – of the past. Ruined Landscape theory developed into the idea of desertification.

Desertification properly means the creation or enlargement of a desert, by natural processes such as a change of climate, or by human activities leading to changes such as the loss of soil exposing subsoil or bare rock. The word implies a *change* in environment or vegetation: the making of a desert where there was not one before: a change from a less desert-like past to a more desert-like present and still more desert-like future.

What is a desert?

To the modern English or American reader the answer is clear: an area without, or with very sparse, plant cover, typically because of dryness. This leads to a precise definition of desertification: an example is the southward expansion of the Sahara which occurred five thousand years ago.

However, there is another strand to the idea of deserts. The word has its origin in the Late Latin equivalent of 'deserted'; it originally meant an unpopulated place, which had lost or never had human inhabitants.[25] English writers from the seventh to the eighteenth centuries regularly equate 'desert' either with 'wilderness' or with 'forest', for example Shakespeare:

> in this desert inaccessible,
> Vnder the shade of melancholly boughes . . .
>
> *As You Like It*, Act II, sc. vii, 110

The modern sense of 'desert', modelled on the Sahara, begins in the sixteenth century and becomes dominant in English in the eighteenth. The earlier sense, rarely used by English or American writers today, is still active in other European languages. In France *désertion* means 'depopulation'.[26] The German *Wüste* is used for places like the Sahara, but its derivative, *Wüstung,* equivalent to 'desertization', is the normal word for 'deserted medieval village'. In Modern Greek *érimos* can be used interchangeably for 'desert' and 'deserted settlement'. For this linguistic reason there is a tendency, especially in southern Europe, to join the ideas of desertification and depopulation, which English-speakers keep apart. Many depopulations were for reasons that have nothing to do with environmental change, yet are often included in the concept of desertification.

The writings of the Spanish scientist Antonio Ponz, based on his travels in the 1750s, demonstrate how observations of depopulation grow imperceptibly, in a southern European language, into a theory of desertification. Ponz, like ourselves, was fascinated by the contrast between the rich Roman remains of Estremadura, eloquent of past population and prosperity, and its modern state of emptiness and lonely savannas. Unlike the twentieth-century traveller, he found this depressing, an affront to civilization and progress:

> How many villages could there not be, ought there not to be, in a land so good and so deserted! On the banks of the Almonte alone and of the other ravines [between Trujillo and Cáceres], in the opinion of very zealous and intelligent persons in Cáceres, there could be a dozen of them. Every day the destruction of this beautiful and fat Province of Extremadura goes further; and if no remedy is applied it will become reduced to a desert. The towns are four, five, and six leagues distant in most places; industry is almost totally destroyed in all the Province; the population is reduced to a shadow of what it was and could be; its wide plains are converted into thick forests of live-oak and cork-oak, and the worst of all into places of *Cistus* and useless shrubs. . . .
>
> I am scandalized to hear that it is all reduced to a hundred thousand inhabitants . . . a province, perhaps the

[24] Rackham 1986.

[25] Except for hermits and monks of the Cistercian order, who were required by their Rule to live in desert places.

[26] See, for example, J. Lévy, 'Oser le désert? des pays sans paysans', *Sciences Humaines*, Hors série 4, 1994, pp. 6–11.

> most fertile in Spain, and among the biggest in Europe . . . has fewer inhabitants than only one of the chief cities of Europe . . .[27]

This area will be discussed in Chapter 12. Ponz set a precedent by attributing the 'desertification' of Estremadura to mismanagement, especially the depredations of the Mesta, the guild of shepherds (p. 201). Like many later writers, he was over-optimistic about whether an unfamiliar landscape could sustain conventional agriculture.[28]

The idea of desertification, if not yet the word, was a subject of controversy early in the twentieth century. E. Huntington's lecture of 1911 to the Royal Geographical Society, the first of the two quotations at the head of this chapter (p. 8), began a lively debate, in which three positions were taken up:

(1) The theory of climatic change. Huntington himself claimed that in Classical times the dry, poorly vegetated east side of Greece had been more like the rainy, well-vegetated west side of modern Greece. The change was independent of human activity.

(2) The traditional degradationist theory.

(3) The theory that Classical Greece operated in a landscape not, after all, very different from modern Greece.[29]

These three theories are still alive, and it will be our business to ascertain where the truth lies.

The word 'desertification' was introduced in Africa by a British and a French forester. In the 1930s E. P. Stebbing, visiting West Africa in the dry season, saw the supposed encroachment of the Sahara as a threat to the more humid lands to the south.[30] A. Aubréville, in 1949, inferred that in a part of Guinea, West Africa, clearance of deciduous forest had been followed by grass fires, erosion and hardening of the soil, so that the forest could never recover. He speculated that further removal of forest might reduce transpiration, thereby (under Woodward–Hales theory) curtailing rainfall further into the interior. 'La savanisation du continent peut-elle conduire à une désertification réelle de l'ensemble de ce continent?'[31]

In later decades, 'desertification' (or *désertisation* in French) was used by Pabot, Le Houérou and Kassas to denote environmental degradation in the Middle East and around the Sahara: 'reduction of the perennial plant cover, impoverishment of the flora, soil erosion, formation of mobile dunes and establishment of desert pavements'.[32]

'Desertification' still retained its more rigorous meaning in the report of the United Nations Conference on Desertification in 1977.[33] But once institutionalized, the concept broadened. By the time of the Convention on Desertification fourteen years later, the United Nations had come to equate it with 'degradation', defined as 'reduction or loss . . . of the biological or economic productivity and complexity' of natural or artificial vegetation.[34] This has been taken to include changes unrelated to the original meaning, such as problems arising from extracting too much ground-water, or from the disposal of toxic waste. Many of the woes ascribed to desertification in the dry tropics are really the effect of ordinary droughts on human populations that are too numerous to cope with drought in traditional ways and too poor to buy in food.[35]

What does 'degradation' mean and how do we recognise it?

The phrase 'degraded landscape' is often on the lips of our Southern European colleagues. If rightly used, as in the United Nations definition mentioned above, it implies the belief that there has been a change: that the terrain was in some sense better, usually more vegetated, at some time in the past than it is now. (It implies also that the change is permanent or semi-permanent; degradation is not always easy to distinguish from the passing effect of two or three dry years.)

Many users of the phrase find it difficult to explain, from first principles, why they believe a particular landscape to be degraded. If pressed, they appeal to generalities rather than citing evidence for the history of a particular site. Having a preconceived standard ('potential climax') of what Mediterranean vegetation ought to be, they pronounce any landscape to be degraded that now falls short of that standard. They fail to distinguish between a mountain that is treeless because of human misuse, and another that is made of hard limestone and has never been suitable for trees.

The matter is made worse by expectations derived from American studies of succession or soil erosion. The original work was perfectly good, but was done in a part of the world very different in climate, soils and vegetation (not in California, which would have been comparable at least in climate), and should not be made the basis of expectations in the Mediterranean.

The vague term 'degradation' has sometimes seemed to us to include almost any change of which the writer disapproves. It often implies a belief that human action caused the change, unlike 'desertification' which can be due to natural causes. Users of the term often have two types of change in mind: (1) alterations to what they believe had previously been

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[27] Ponz 1778, VIII, iii, pp. 16, 60.

[28] Ponz, though he hated forests, was a passionate and ingenious propagandist for tree-planting – as long as trees were kept where they belonged, in hedges and the edges of fields.

[29] Huntington 1910.

[30] E. P. Stebbing, 'The threat of the Sahara', Extra Supplement, *Journal of the Royal African Society*, 1937.

[31] A. Aubréville, *Climats, forêts et désertification de l'Afrique Tropicale*, Société d'Éditions Géographiques, Maritimes et Coloniales, Paris, 1949.

[32] H. Pabot, 'Peut-on arrêter la désertification des régions sèches d'Orient?', *Compte rendu du Colloque de Téhéran sur la conservation et la restauration des sols*, Institut Français de Coopération Technique and Faculté d'Agronomie de l'Université de Téhéran, 1960, pp. 120–25; H. N. Le Houérou, *La désertisation du Sahara septentrional et des steppes limitrophes*, Proceedings of the IBP Hammamet Technical Meeting on the Conservation of Nature, Hammamet, Tunisia, 1968; M. Kassas, 'Desertification versus potential for recovery in circum-Saharan territories', *Arid Lands in Transition*, ed. H. Dregne, American Association for the Advancement of Science, publication 90, Washington, D.C., 1970, pp. 123–42; H. N. Le Houérou, 'North Africa: past, present, future', *ibid.*, pp. 227–78.

[33] United Nations Conference on Desertification, Nairobi, *Desertification: its Causes and Consequences*, Pergamon, Oxford, 1977.

[34] *United Nations Convention to Combat Desertification in those Countries experiencing serious Drought and/or Desertification, particularly in Africa*, Her Majesty's Stationery Office, London, 1995.

[35] Thomas & Middleton 1994.

primaeval forest, and (2) types of change (such as erosion) that cause land to become less suitable for European-type agriculture. The term 'degradation' easily becomes loaded with value-judgements.

Less excusably, some scholars and propagandists use 'degradation' and 'desertification' in situations with no evidence of environmental change at all. The mere existence of a desert, or of something that can be described as one, is taken as evidence of desertification, whereas (for all the writer knows) the desert may have been present throughout history and may even have shrunk. A savanna is categorized as 'degraded forest' without evidence that it is not, in fact, a grassland that has become invaded by trees. In this book we shall try to confine the use of 'degradation' and 'desertification' to examples where it is known that the present state is the result of a change for the worse.

Does desertification (or degradation) lead to deserts?

It is widely believed that human action can enlarge or shrink deserts. The classic example is the High Plains of North America, originally known to explorers as the Great American Desert, and then settled by pioneers in the belief that cultivation and tree-planting would create rainfall. A temporary wet period in the 1870s and 1880s seemed to justify this notion. Then the rains died away and the region became the Dust Bowl of the 1930s, which in turn was supposed to be the result of human misuse of the land. The reality is that in most semi-arid regions rainfall has its ups and downs, regardless of human actions, and it is foolish to mistake unusually wet periods for the normal state.[36]

The experience was repeated in western New South Wales, much of which was well-treed savanna in 1870 and by 1900 had been converted, so far permanently, into treeless semi-desert.[37] This was due to the sudden arrival of European settlers in a relatively wet period; to the introduction of sheep, cattle and rabbits into an ecosystem to which they were not adapted, and which was not adapted to them; to the vegetation being easy to destroy; to the return of drought after a few years; and to the soil and subsoil being exceedingly susceptible to wind erosion.

In Europe such dramatic changes are rare.[38] Land may become unusable for conventional agriculture, but usually remains vegetated. 'Degraded' land is often rich in animal and plant life, strikingly beautiful, loved and valued as an amenity by its inhabitants; an extreme case is the bizarre landscape of the ancient stone-quarries at Syracuse (Sicily). Even land poisoned by heavy metals tends to become vegetated with heavy-metal-tolerant plants. The Arádhena plateau in SW Crete is a tableland of hard limestone which once had soil and is now covered with the walls that enclosed ancient fields. The soil was probably lost through wind and karst erosion (p. 261). Some might regard this as a classic case of desertification through inappropriate agriculture, but the plateau is now covered in pine forest and maquis (Fig. 14.23), and is probably more vegetated than when it was farmed.

Whether government intervention can prevent desertification is uncertain; it can certainly create it. In SW Asia a fatal combination of visionary technologists and corrupt Soviet politicians, setting out to transform the modest traditional economy of the arid lands around the Aral Sea, produced a hell of drought and salinization. In the United States, the government has done its best to rival this achievement by subsidizing the extension of the Great American Desert into savanna rangelands.[39]

Current research on desertification: the scope of MEDALUS

The Sahara has waxed and waned with global climatic changes throughout the Quaternary (Chapter 9). It expanded around 3000 BC, when much of tropical Africa became more arid. In modern times rainfall has varied markedly from decade to decade. Drought in the Sahel, about the time of the United Nations Stockholm Conference on the Environment in 1972, drew attention to the human and environmental problems of semi-arid lands. When the United Nations organized the Nairobi conference on desertification in 1977, Spain (with its extensive desert-like landscapes) was a participant, and was one of the first countries to set up an official body concerned with desertification.[40] Parts of southern Europe were put on world maps of desertification risk.

The matter became more acute in the 1980s through public concern over global warming. Several countries likely to be affected had newly joined the European Community. Dry years used to bring famine to the European Mediterranean, and still bring discomfort: cities such as Athens suffer water shortage, agriculture withers, forest fires turn the sun to blood, and tourists find gypsum in their coffee. If this were to persist year after year the results would be serious, as they well might be if (as early climatic models predicted) rainfall were to diminish in southern Europe over the next half-century.

An attempt to foresee the likely consequences was probably the main stimulus for the series of MEDALUS (MEditerranean Desertification and Land Use) research projects, set up by the European Community from 1991 onwards. MEDALUS has involved some forty institutions all over Europe, most of them university departments, but also official or commercial organizations.[41]

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[36] M. H. Glantz, 'Drought, desertification and food production', Glantz 1994, pp. 7–32; Raban 1996.

[37] D. Lunney, 'Review of official attitudes to western New South Wales 1901–93 with particular reference to the fauna', *Future of the Fauna of Western New South Wales*, ed. D. Lunney and others, Royal Zoological Society of New South Wales, Mosman, 1994, pp. 1–26.

[38] See, for example, A. T. Grove, 'Desertification in Southern Europe', *CC* 9, 1986, pp. 49–57.

[39] T. A. Saiko, 'Implications of the disintegration of the former Soviet Union for desertification control', *EMA* 37, 1995, pp. 289–302; K. Hess & J. L. Holechek, 'Policy roots of land degradation in the arid region of the United States: an overview', *ibid.*, pp. 123–41, and 'Government policy influences on rangeland conditions in the United States: a case example', *ibid.*, pp. 179–87.

[40] A. T. Grove, 'Desertification in the African environment', *Drought in Africa 2*, ed. D. Dalby, R. J. Harrison, F. Bezzaz, African Environment Special Report, International African Institute, University of London, 1976, pp. 54–64; A. T. Grove, 'Desertification', *PPG* 1, 1977, pp. 296–310.

[41] For a list of dependent projects see Mairota and others 1998, pp. 6–7.

Most attention has been paid to soil structures and erosion, partly because of the effects on agricultural land, but also because of heavy investment in dams and reservoirs, which get filled up and made useless by sediment resulting from erosion. Models of erosion in relation to rainfall intensity, plant cover, soil and rock conditions, and angle and length of slope are given in the book resulting from MEDALUS 1.[42] These researches are further developed in Projects I and II of MEDALUS 2. Project IV of MEDALUS 2 involves studies of portions of three catchments in Italy and Spain where various problems, described as desertification, have arisen or are expected.

Prediction of future changes

Climate is not the only variable. In southern Europe, in contrast to the African and Asian Mediterranean, the total population has stopped growing for the first time in two hundred and fifty years, but wealth and rates of consumption have steadily increased. Tourism, a factor for over a thousand years, has grown so far that the Mediterranean is now the greatest tourist destination in the world. (Even Crete, however, is by no means entirely dependent on tourism.) Tourists and immigrants from the north have greatly increased the populations of cities and coastlands. At the same time, agricultural activity has been concentrating on the plains, where machinery and irrigation can readily be employed. In these areas pressure on resources has been increasing in Mediterranean Europe as fast as in underdeveloped countries. The demand for water by agriculture and cities is coming to exceed the supply.

In the mountains, human pressure on resources reached a maximum between fifty and a hundred and fifty years ago, and has now declined. In these areas, no longer the most vulnerable to desertification, other threats have arisen. Cultivation has been abandoned, and fewer flocks and herds move from the plains in the winter to the mountains in the summer. Landscapes which once reflected the diversified activities of people extracting a livelihood from a difficult but varied environment are now being reduced to a monotony of trees, shrubs and burnt trees and shrubs.

Over the next few decades the main threat will probably come not from global warming but from technical and economic changes. These are an extension of the powerful and deep-seated forces that have converted Mediterranean Europe within a century from being predominantly poor, over-populated and agricultural to one of the most prosperous regions on earth. New opportunities have been created, but there are penalties. Piped irrigation results in political troubles with distributing limited supplies of water. Labour-saving methods of cultivation increase unemployment and create thousands of tons of rotten plastic. Tourism creates millions of tons of what sometimes are already rotting concrete buildings.

Changes in environment and landscape generally have distant time-horizons. The future political and economic context of 'desertification' in southern Europe is likely to be no more reliably predictable than the climate. Could the changes of the past fifty years have been predicted in 1950? Can the changes of the next fifty years be predicted now?

Many of the problems with which we are concerned can be mitigated by improved management, but not solved: they will not go away. Policies to mitigate 'desertification' are generally unpopular with governments and voters. They are poorly presented, they involve restraint in order to sustain production, they cost money, they restrict profitable activities in the short term in order to secure the resource base for the future, and they reveal that governments are not omnipotent. It is important to select areas and problems that can easily and economically be dealt with, and not to waste resources on trying to cure problems that either are not really problems or that have no solution.

THE WRITING OF THIS BOOK

This book has emerged as a part of Project III of MEDALUS 2, which is concerned with managing desertification, but we emphasize that the views expressed are our own and not necessarily endorsed by our colleagues.

Desertification in this book

We cannot limit this book to 'desertification' in its proper sense of the creation of deserts: if we did there would be no book left. Nor can we cover all the myriad examples of depopulation not linked to environmental change. We try to cover most of the *changes* in the environment and vegetation that have been regarded as desertification. But we insist that it is changes and processes with which we are concerned. The mere existence of a 'desert', without evidence as to how or when it came into existence, does not constitute desertification. Nor does the existence of a badland (a severely gullied area), without knowledge of its history, constitute land degradation. The first problem in dealing with desertification is to identify it.

Methods

The Mediterranean is not easy to study. Many processes are episodic and do not go on all the time. This is not limited to fires, deluges and earthquakes. An area may have trees of about (let us say) 90, 210, 240 and 570 years old, but not of intermediate ages; these represent years when circumstances (such as late spring rains, a preceding fire and disease among the goats) conspired to favour the growth of new trees.

It is difficult to plan studies to be representative in space and time. Somebody studying erosion gets a research grant for three (or, if very lucky, four) years from a body such as MEDALUS. To avoid 'wasting' the grant on nil results, equipment is installed on a site where erosion is already thought to be important. With good management, three rainy seasons' data are collected. However, those seasons are unlikely to include the hundred-year-maximum rainfall which may cause much of the erosion. The measurements thus tend to

[42] Brandt & Thornes 1996.

overestimate erosion in space and underestimate it in time – both biases being artefacts resulting from the anthropology of how research is organized.

Historical ecologists have to take their material where they can find it. Written records are limited to times and places where people have been writing things down. Pollen analysis is limited to places with suitable deposits, such as Corsica but, so far, not Sardinia.

Documents

> I cannot determine what I ought to transcribe, till I am satisfied how much I ought to believe.[43]
>
> The most important characteristic of an intelligence officer has to be intense scepticism, such that he never believes anything he reads or is told unless there is some other reason for believing it.[44]

Written records are wonderful things, but we must consider what they can and cannot tell us. Taking documents at face value led scholars to construct a pseudo-ecology of Ancient Greece, one strand in Ruined Landscape theory.

To rely on written history has many disadvantages, such as that it cuts us off from knowing what was going on at times when nobody was writing. If the Alpujarra (south Spain) has no records before the Arab period, this does not prove that nothing happened there.

Documents are haphazard in their occurrence: in Graeco-Roman times they have much to say about Athens and Rome, little about Spain or north Greece. This is due to accidents of survival, not because unrecorded areas were unimportant. Archaeology leaves no doubt that the late Roman period was the highest point of Cretan civilization after the Minoan, yet all the writings about Crete at that time could be got on to a postcard.

Ancient Greek authors tell us comparatively little about what Greece looked like; they assumed that their readers would know. Poets, philosophers and dramatists were more interested in getting the metre, philosophy and dramatic conventions right than in handing on accurate incidental details about landscape.[45] The Romans, to judge by surviving writings, were more ecologically minded: for example, Columella wrote about coppice-woods and deer-parks, and Siculus Flaccus and Palladius Rutilius about hedges.

Landscape history is best arrived at from the records of identifiable sites, which can be traced down the centuries in the archives and compared with what is there now. We shall do our best to find a Greek equivalent of Wicken Fen, England, or an Italian equivalent of Harvard Forest, Massachusetts, but we often have to make do with contemporary generalizations and other third-rate sources. Generalizations may or may not have been right. The history of the landscape must not be confused with the history of the things that people have *said* about the landscape.

From the ancient Greeks and Romans, unfortunately, what survives is seldom workaday accounts of actual events ('in year A we cut B acres of the wood-lot called C and sold it to D for E pieces of silver'). Occasionally inscriptions help out the generalized evidence in literary sources. The ancients committed surprisingly mundane regulations and transactions to tablets of stone.

Written evidence has to be verified. What was the status of the story – was it meant as fact, fiction, myth or proverb? Was the author in a position to know what he was writing about? We are suspicious of authors who wrote about places that they had not been to, or times long past. Some, such as the Roman pseudo-zoologist Aelian, mixed fact and fiction and seemed not to care which was which. Crete was a legendary, little-visited land about which even Plato felt at liberty to write nonsense. Everyone 'knew' that Crete has no snakes and no owls, and that any introduced to the island died.

The meaning of words is often not obvious. American authors think they know the difference between 'forest' and 'scrub', but modern Greeks often do not draw that distinction; did ancient Greeks do so, or Spanish Arabs? A landscape which an Arab describes as 'wooded' may not seem wooded to a Finn; what meaning are we to extract from such descriptions in ancient Greek or Roman authors? The Spanish language, like modern Greek, has no certain word for 'forest'. The word *monte* originally meant 'mountain'. Medieval and early-modern Spanish writers use *monte* for almost all rough-land, from forest, savanna and maquis to cistus and esparto-grassland; they seem not to care which is meant.[46] Today, although Spanish foresters usually call forest *monte,* the word has still not lost its other uses, including the original 'mountain'. We shall use words like 'live-oakery' and 'pinery' to mean an area of trees, without committing ourselves to whether it was forest, savanna or maquis.

It is essential to read the original documents and not to trust others' translations and interpretations. As experience in England shows, errors in interpretation are not neutral: they tend to play up the landscape of the past and to play down the landscape of the present. Early references to trees are quoted as implying forests, and re-quoted as 'magnificent forests'; present forests are dismissed as 'scrub'. Translations in this book are ours unless otherwise stated.

A sure route to pseudo-history lies in ignoring the behaviour of plants and animals. Historians gather ancient allusions to people cutting down trees, and assume that these add up to a record of deforestation,[47] as if depleting a forest by cutting down trees were the same as destroying it. In reality, deforestation is felling not balanced by regrowth, and both need to be considered. One does not pronounce a firm to be insolvent without investigating its income.

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[43] E. Gibbon, *The Decline and Fall of the Roman Empire*, 1776, chapter XVI.

[44] F. H. Hinsley, *Intelligence in the Second World War*, Eagle, 1993, p. 40.

[45] J. Roy, 'The countryside in classical Greek drama, and isolated farms in dramatic landscapes', Shipley & Salmon 1996, pp. 98–118.

[46] Modern Japanese *yama* and Byzantine Greek ὄρος (A. Dunn) mean both 'mountain' and 'forest'.

[47] J. D. Hughes, 'How the ancients viewed deforestation', *JEA* 10, 1983, pp. 437–45.

Official statistics

> The pretended exactness of statistical tables is generally little better than an imposture; and those founded not on direct observation by competent observers, but on the report of persons who have no particular interest in knowing, but often have a motive for distorting, the truth – such as census returns – are commonly to be regarded as but vague guesses at the actual fact.[48]

Mediterranean countries have statistical institutes which gather masses and masses of data. If one wants the area of forest in each of the 368 townships in Sardinia (to the nearest hundred square metres), or the number of rabbits in Greece (to the nearest rabbit), or the number of farms in Basilicata of between 3.00 and 4.99 hectares that employ non-family labour, libraries of tables are at one's disposal. How much use are they?

In most countries the ultimate unit is the township (civil parish, 'municipality', 'village community', *comunità*, *commune*, κοινότις, etc.) This is an area of between 2 and 100 sq. km, typically containing one big village, two or three small villages, or a number of hamlets. Every hectare of land normally belongs to one and only one township. Most statistics begin with observations at township level. They are copied, tabulated and summarized by provincial, regional and national institutions, ending, maybe, with the Worldwide Fund for Nature or the United Nations Food and Agriculture Organization. In the process they gain in authority and acceptance, but not in accuracy: however august the sponsoring body, they remain the responsibility of the countryfolk who originally filled in the forms.

A first difficulty is that most Mediterranean countries, and many regions, are not wholly Mediterranean. National statistics for France are of little use in investigating the small part of France that is Mediterranean.

Secondly, statistics hide problems of definition. In England, forests have nice sharp edges, and it is usually easy to decide whether a particular hectare is forest or not. In Mediterranean countries, forest grades into non-forest via maquis (where trees are reduced to the form of shrubs) or savanna (land with scattered trees). A statement of forest area is worthless unless accompanied by definitions of the points at which trees are big enough, and close-set enough, to count as forest. The differences are not trivial: statistics for Crete of the extent of δάσος, usually translated 'forest', range from 4½ per cent of the island in 1981 to 33 per cent of the island (from another official source) in 1992. (Trees did increase between those years, but nowhere near sevenfold.) Spanish forestry statistics are equally useless.[49] Without comparable definitions, official statistics cannot prove that Crete is more, or less, forested than Majorca. If 'forests' covered 24.76 per cent of Ruritania in 1901 but only 15.48 per cent in 1981, we do not know, without further investigation, whether forest has decreased or the definition of forest has become more restrictive. To take another illustration, of what value are counts of tractors in a land in which every farm has a graveyard of tractors in varying states of decrepitude?

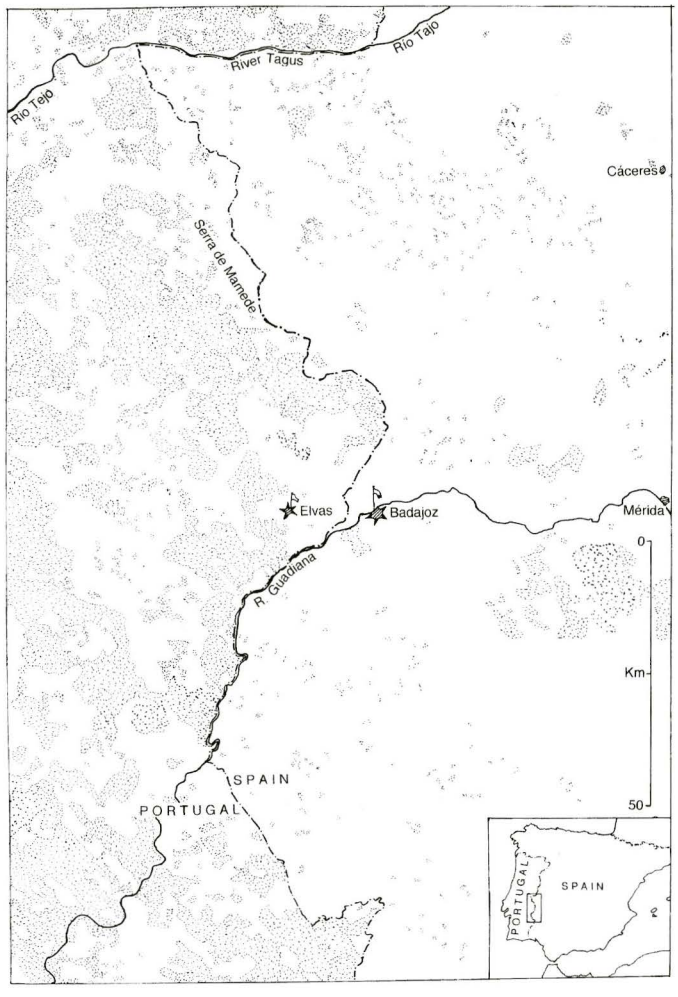


Fig. 1.5. Distribution of 'forest' on the border between Spain and Portugal, after a recent topographical map. The principal vegetation on both sides is savanna, trees widely spaced in grassland (Chapter 12). The Portuguese cartographer considered *montado* to be forest; his Spanish colleague considered *dehesa* to be non-forest. In reality they are identical, and continue uninterrupted across the border. With this example before us, can we believe statistics of 'forest' area?

Thirdly, statistics can be tendentious. Livestock numbers are doubtful in countries where shepherds regard the number of their animals as confidential and will not reveal it to officials or anyone they suspect of being in league with officials. Sometimes they over-declare their animals to collect subsidies; sometimes they under-declare them because of a long-engrained habit of avoiding taxes. Many studies report far more livestock – which are not starving – than the land is supposed to be capable of carrying. Bureaucracy has devised a certificate system to prevent misdeclaration; but in a wicked world sheep are stolen and goats fall over cliffs, and the wise shepherd keeps a few extra certificates in a dry rockhole.

[48] George Perkins Marsh, *Man and Nature*, 1864.

[49] Gutiérrez and others 1985.

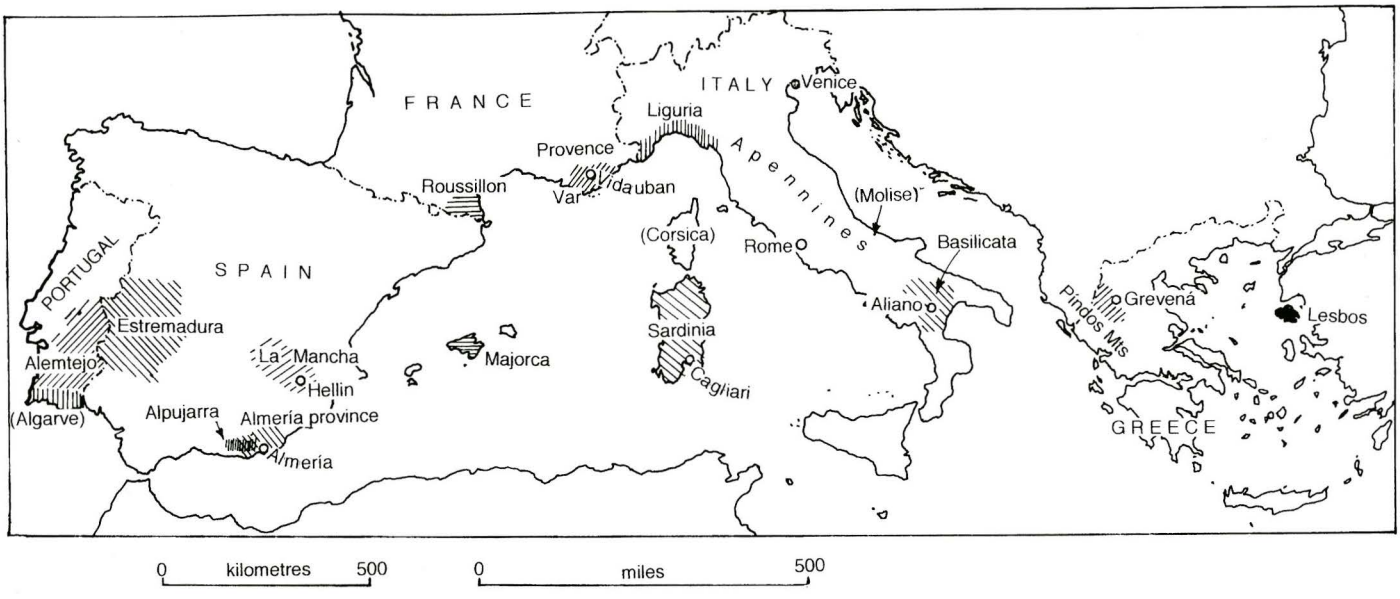


Fig. 1.6a, b. Areas that we discuss in detail. Names in brackets indicate where we do not know the region well ourselves, but draw on the work of others.

Human statistics are not exempt. The United States population was reported to have increased by 11.5 per cent between 1970 and 1980; nearly one-quarter of this increase was due not to more people but to more efficient counting.[50] The census of Britain in 1991 is supposed to have undercounted by 5 per cent because the government had tried to impose a poll tax and people refused to be counted. In countries like Greece, people have second and third homes. Cretans who migrate to Herákleion, or Athens, or even (in one instance known to us) to California have not necessarily given up being mountain farmers. Census figures depend on where people choose to be; many return, like Mary and Joseph, to the ancestral home. Ships and planes are busy around census day. The 'hard facts' of rural depopulation involve guesses about where people really live.

Economists move in a North European world of neatly defined jobs, animals and residences, often at variance with Mediterranean realities. A friend of ours, a typical Cretan, is a farmer, fisherman, restaurateur and hotelier. Is he 'engaged in the agricultural sector?' Do the fish he catches for his guests, or the help he gets from his mother-in-law, count towards the Gross National Product of Greece? How many of his 'jobs' would he have to lose to count as unemployed? If Greek statisticians have solved these problems, can we be sure that they have solved them in the same way as their Italian colleagues or their Greek predecessors in 1960? Statistics from government, and even the Food and Agriculture Organization, are anthropological data and need to be verified. As Paul Halstead remarked at a conference:

> Two or three times . . . the argument has been advanced that statistical records can be used to disprove epigraphic information or travellers' accounts. I think we need to treat statistical records as epigraphic accounts too; they may have their own agenda. This has been very well illustrated in the last ten years as various rural products have gone from being taxed to being subsidized by [the European Union]. The number of olive trees or sheep declared by various places has increased vastly and by margins which exceed the reproductive capacity of olives or sheep.[51]

The importance of fieldwork

> Verbis ne temere credes. Non auribus, sed oculis aspice,
> Nam aures mendacii, oculos veritatis ostia iure dictitant.
>
> Do not heedlessly believe words. Observe with eyes, not ears; / For they rightly declare that ears are the entrances of falsehood, and eyes of truth.[52]

[50] 'Overestimated undercount', *SA* 244 (5), 1981, p. 70.

[51] Wells 1992, p. 132.

[52] Francesco Basilicata, *Cretæ Regnum [The Realm of Crete]*, 1618.

All sources of evidence must be used. It is no use writing a history based entirely on written documents such as Sonnini and Barthélemy had before them, as many authors still do, disregarding all discoveries in other fields in the last two hundred years. Nor is it any use analysing official statistics without verifying them. An argument based on written sources becomes much stronger if corroborated from some independent direction.

There is no substitute for field observation. Even in citing the results of someone's experiment, the site has to be given a context; published reports rarely contain the particulars. The observant traveller, not bound by a preconceived agenda, is forever noting details that other investigators have missed: traces of past fires and deluges, ancient trees and the degree to which their bases have been buried by build-up of soil, the state of vegetation in relation to browsing, etc.

Although landscape itself is objective, different observers notice different things and have different expectations. A non-botanist may overlook the crucial distinction between fire-promoting trees such as pine and fire-hating trees such as fir, or between trees that have or have not survived being cut down. Areas that McNeill describes as deforested we, a few years later, have sometimes remarked as well-forested; this we interpret, not as a real change, but as illustrating how an American has a more exacting standard of what he is prepared to call forest than Europeans.

We make no apology for introducing our own field observations and distinguishing them from those of others (the word 'we' means that one or both of us has been present). The interest of Oliver Rackham in Mediterranean desertification began with an invitation from P. M. Warren, the Cretologist, to the excavation of a Bronze Age site at Myrtos, in arid SE Crete, in 1968. Both of us have been involved in many later studies in Crete, some archaeological, some otherwise, often in collaboration with Dr Jennifer Moody from Texas.

From Crete we have gone out into other countries. We cover most types of Euro-Mediterranean landscape and habitat except urban areas, but do not claim to be either even or random in our choice. In paying attention to Sardinia we do not disparage the glorious and utterly different island of Corsica. To include everything would be a lifetime's work, and would result in a shelf of books.

We have thought it best to select areas small enough to study at first hand (Fig. 1.6). The Mediterranean is more complex than (say) the United States, and one of our criticisms is that other scholars have tried to over-generalize and tend to copy what others have written. We have usually chosen places where colleagues have been working, rather than investigating unknown terrain. In a study of desertification, we have paid more attention to dry regions than to well-watered areas (such as the interior of Tuscany, studied in loving detail by Vos & Stortelder[53]) where the risk of desertification is remote. We have paid special attention to dramatic and special features of the dry Mediterranean, such as badlands, savannas and fiery terrain.

[53] W. Vos & A. H. F. Stortelder, *Vanishing Tuscan Landscapes: landscape ecology of a submediterranean-montane area (Solano Basin, Tuscany, Italy)*, 2nd edn, PUDOC, Wageningen, 1992.

ON DATES

Radiocarbon dating is based on the fact that a little of the carbon dioxide in the atmosphere contains the radioactive isotope C14 instead of ordinary carbon C12. After a plant has taken up carbon dioxide and has converted it into wood or peat, the C14 disappears by radioactive decay at a constant rate. The proportion of C14 still remaining in the wood or peat is a measure of how much time has elapsed since it was laid down by the plant.

Radiocarbon dates are calibrated by measuring the C14 content of past annual rings of very long-lived trees. For various reasons, the proportion of C14 in the atmosphere has fluctuated, so that the relation between the present C14 content of a sample and the date is complicated (Fig. 1.7).

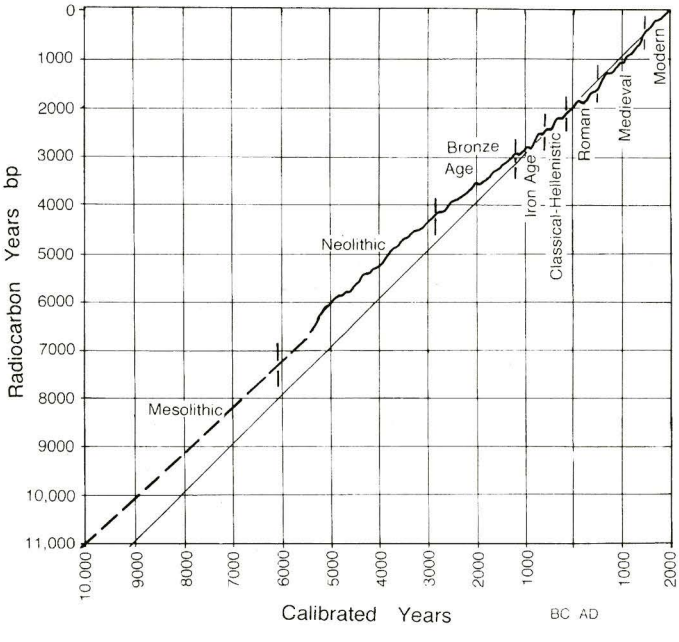


Fig. 1.7. Generalized relation (omitting small-scale details) between 'dates' bp or bc obtained by radiocarbon measurement and real dates BC or AD from tree-rings.

The various sciences on which this book draws have different conventions for expressing dates. For simplicity we shall work wherever possible in terms of calendar years. We adopt these conventions:

- Dates BC, AD or BP represent actual calendar years, derived from documents or from counting the annual rings of trees. BP means years Before Present, that is before 1950 AD. This book is published in the year 2000 AD = -50 BP.
- Dates BC, AD or BP represent calibrated radiocarbon dates, that is radiocarbon dates adjusted for fluctuations in the C14 content of the atmosphere. They are based ultimately on counting the annual rings of trees.
- Dates bp represent unadjusted radiocarbon dates ('radiocarbon years').
- Decades are referred to thus: 'the 1700s' means 1700–9 (not the same as 'the eighteenth century'), 'the 1710s' means 1710–19, etc.

Notes

1. Continuous tree-ring records have been used to construct a calibration curve for the last 9,840 years, and with less certainty back to 11,440 calendar years BP (about 10,000 years bp). Comparisons of uranium/thorium and radiocarbon dating of corals have extended the calibration curve for atmospheric as well as marine samples back to 21,950 bp, with greater uncertainty. The geomagnetic intensity record has been used as a standard to extend the calibration back to 45,000 years BP in a generalized way. An alternative, potentially exact, method, extending back to at least 38,000 BP involves counting the annual layers of lake sediments, and measuring the carbon isotopes of land shells that fell into the lake and are embedded in the layers.[54]
2. Although many scientists think in terms of 'radiocarbon years' bp, these do not represent equal intervals of time as do years BC, and as years BC are intended to do. The interval between 5350 and 5450 bp is not equal to the interval between 5550 and 5650 bp.
3. Dates bp are quoted with confidence limits ('5550 ± 120 years bp') which depend on the precision of measuring the C14 content of the sample. For dates BP there is an additional uncertainty deriving from the calibration. Confidence limits for BP dates are (usually) wider than for bp dates, and may be asymmetrical.
4. Where we quote calendar years AD and BC, our practice has been (where possible) to take the original dates bp with their quoted laboratory errors and re-calibrate them by means of the CALIB 3 User's Guide, based on the Stuiver–Reimer calibration. We show the 1σ (1 s.d., one standard deviation) range or ranges.

CHRONOLOGICAL PERIODS

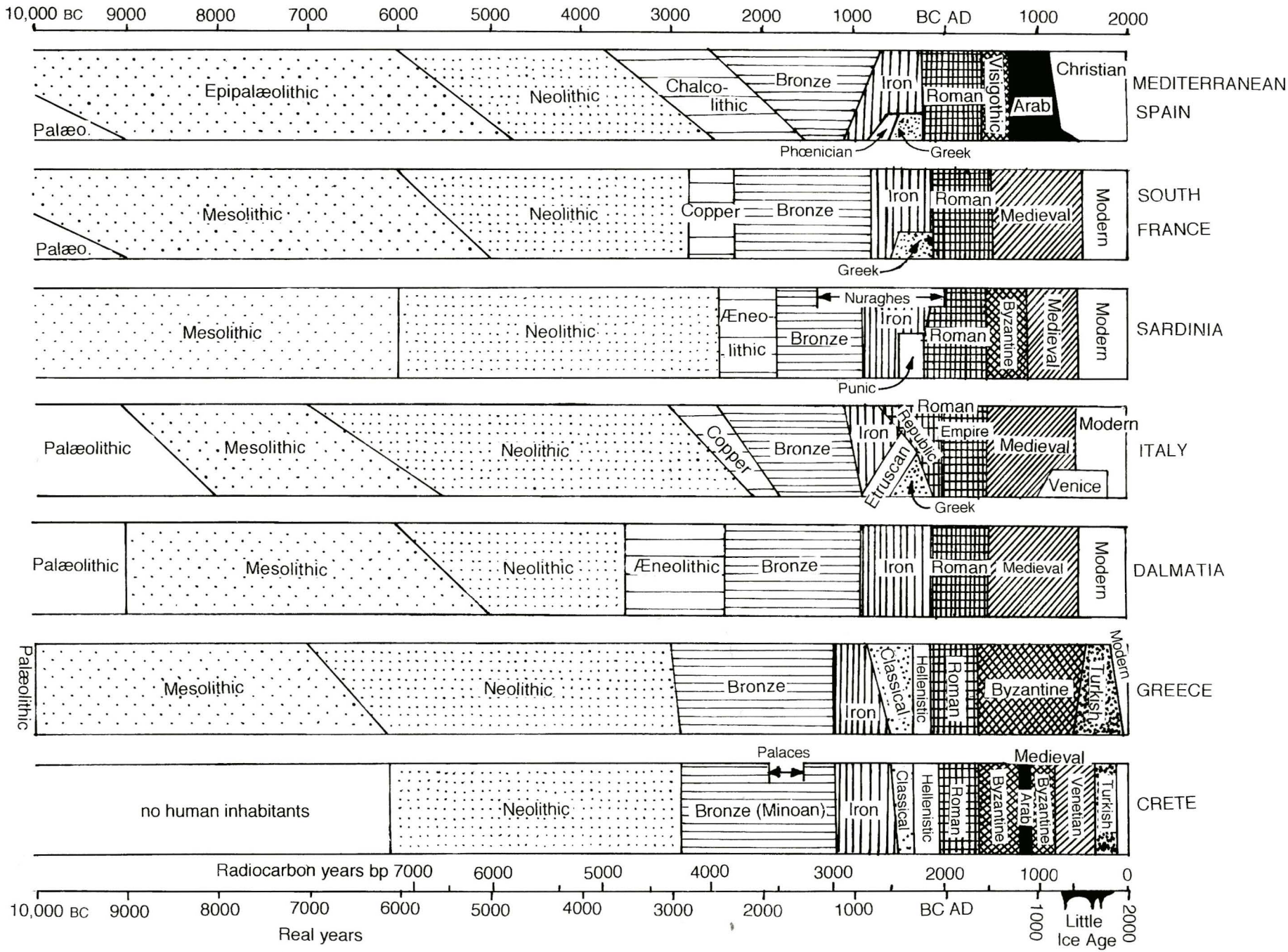
Archaeologists use terms like Neolithic or Iron Age both to indicate a particular degree of human technology and to give an indication of date. For so big an area as the Mediterranean this is difficult. Not only were technologies taken up at different dates, but scholars in different countries have different lists of periods and define them in different ways. Since we cannot avoid the usage, we summarize the information in Fig. 1.8. Further terms are:

Pleistocene: the last two million years, containing the series of powerful climatic fluctuations and glaciations known as the Ice Ages.
Holocene: the last 11,500 years, approximately the interval since the end of the the Younger Dryas, a cold episode that terminated the Last Glaciation.[55]
Quaternary: Pleistocene + Holocene.

Fig. 1.8. Archaeological periods as commonly used in various countries. Dates are approximate: this should not be treated as a definitive reconcilement of the often conflicting data and usages.

[54] M. Stuiver & P. J. Reimer, 'Extended 14C database and revised CALIB radiocarbon calibration program', *Radiocarbon* 35, 1993, pp. 215–30; Van Andel 1998; C. Lal, A. Mazaud & J. C. Duplessy, 'Geomagnetic intensity and 14C intensity in the atmosphere and ocean during the past 50kyr', *Geophysical Research Letters* 23, 1996, pp. 2045–8; H. Kitagawa & J. van der Plicht, 'Atmospheric radiocarbon calibration to 45,000 yr B.p.; Late glacial fluctuations and cosmogenic isotope production', *Science* 279, 1998, pp. 1187–90.

[55] N. Roberts, *The Holocene: an Environmental History*, 2nd edn, Blackwell, Oxford, 1998.


10,000 BC 9000 8000 7000 6000 5000 4000 3000 2000 1000 BC AD 1000 2000
Epipalæolithic
Palæo.
Neolithic
Chalco-lithic
Bronze
Iron
Roman
Visigothic
Arab
Christian
Phœnician
Greek
MEDITERRANEAN SPAIN
Mesolithic
Palæo.
Neolithic
Copper
Bronze
Iron
Roman
Medieval
Modern
Greek
SOUTH FRANCE
Mesolithic
Neolithic
Æneo-lithic
Bronze
Nuraghes
Iron
Roman
Byzantine
Medieval
Modern
Punic
SARDINIA
Palæolithic
Mesolithic
Neolithic
Copper
Bronze
Iron
Etruscan
Republic
Roman
Empire
Medieval
Modern
Venice
Greek
ITALY
Palæolithic
Mesolithic
Neolithic
Æneolithic
Bronze
Iron
Roman
Medieval
Modern
DALMATIA
Palæolithic
Mesolithic
Neolithic
Bronze
Iron
Classical
Hellenistic
Roman
Byzantine
Turkish
Modern
GREECE
no human inhabitants
Neolithic
Palaces
Bronze (Minoan)
Iron
Classical
Hellenistic
Roman
Byzantine
Arab
Medieval
Byzantine
Venetian
Turkish
CRETE
Radiocarbon years bp 7000 6000 5000 4000 3000 2000 1000 0
10,000 BC 9000 8000 7000 6000 5000 4000 3000 2000 1000 BC AD 1000 2000
Real years
Little Ice Age

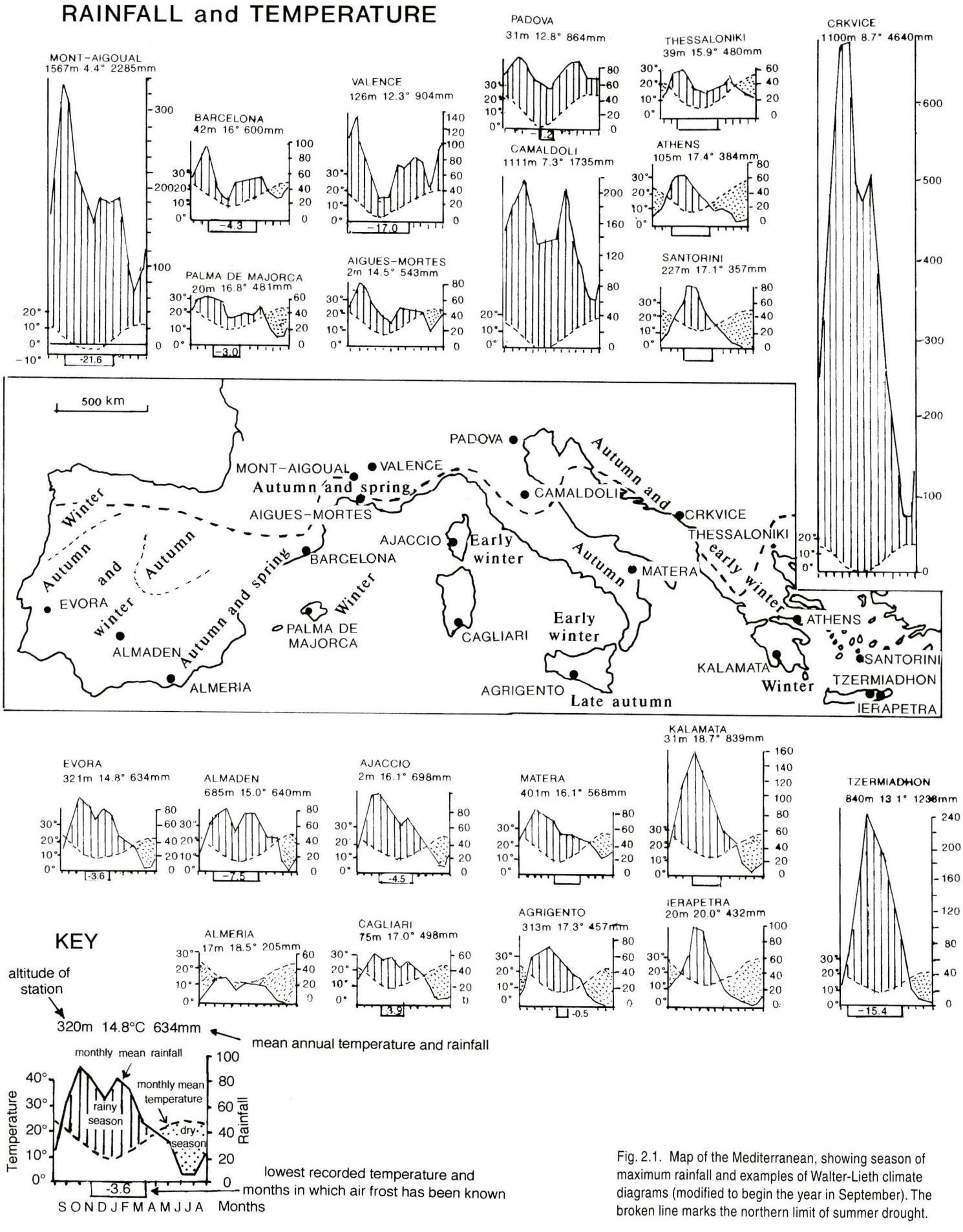


Fig. 2.1. Map of the Mediterranean, showing season of maximum rainfall and examples of Walter-Lieth climate diagrams (modified to begin the year in September). The broken line marks the northern limit of summer drought.