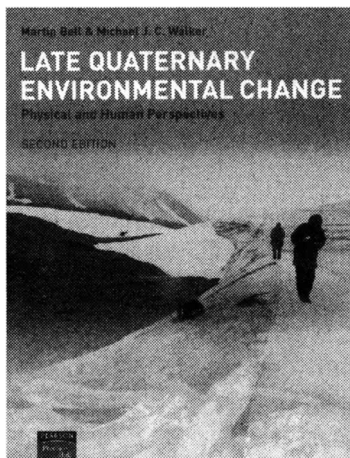


## BOOK REVIEW



Martin Bell & Michael J C Walker. *Late Quaternary Environmental Change: Physical and Human Perspectives* (2nd edition). 2005. Harlow: Pearson-Prentice Hall (1st edition, 1992). ISBN: 0-1303-3344-1. 348 pages of numerous figures, drawings, plates, and tables; 59 pages of some 1500 references; 15-page index. List price \$80 US (trade paperback).

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Bell and Walker's geomorphological-paleoecological-anthropological tour de force focuses on cultural and physical geography, especially of Europe and the Northern Hemisphere, without neglecting marine sediments, postglacial tectonics, and other prehistoric archives. Historic changes, events in radiocarbon time, and the Quaternary in general are in the spotlight. We learn of geomorphology, past environments, anthropogenic influences, and biotic and climate change.

Rich in photographs, drawings, and graphs, Bell and Walker's chapters include evidence for natural and human-mediated environmental change and human activity; consequences of climatic change; people in a world of constant change; cultural landscapes; people, climate, and erosion; the role of the past in a sustainable future; environment and heritage conservation; and the impact of people on climate.

Bell and Walker provide a chance to brush up on (or to get up to speed on) elements of astronomical theory, SSTs (sea surface temperatures) at the last glacial maximum, salinity and ice cover in the northwest Atlantic, pattern of retreat of the Scandinavian ice sheet at the end of the last cold stage, and the radiocarbon calibration curve. I have mentioned just some of the material illustrated in their first chapter. The intriguing extinctions of near time are summarized by two excellent maps, one of global extinctions and the other showing extinctions on oceanic islands in the Mediterranean.

My one suggestion for a future edition is based on my arid land bias. Bell and Walker need to discover fossil mammal ("packrat," or in this case "hyrax") middens of arid lands. The rich record of change in  $^{14}\text{C}$  time employing fossil mt DNA techniques is especially promising in analyzing fossil middens, as Betancourt and others have shown in the Andes of South America.

The challenge of presenting so many new findings on a world scale is daunting. Bell and Walker publish a map (adopted from Franz Vera) showing a 50% reduction in North American bison range in the last 500 years. They neglect to mention that in the first century after Hernando de Soto conquered New World city-states east of the Mississippi, bison range expanded east of the Mississippi. Presumably de Soto benefited by the same unacknowledged "5th column," unintentionally introduced Old World diseases, just as Jared Diamond (*Guns, Germs and Steel: The Fates of Human Societies*. 1999. New York: W. W. Norton) argues that diseases they unwittingly introduced fueled the rapid and sweeping Spanish conquest of Mexico and Peru.

Another boundary condition that Bell and Walker introduce invites comment. The Dutch, Vera in particular, are reviewing pollen diagrams as though browsing mammals made a difference. The wisent, for example, an Old World relative of bison, may have played an important role in forest tree succession in Europe.

What about American plant dynamics, indicated by pollen analysis? Recent work by Burney and Robinson on mastodon fossil remains in New York State suggest that an explosion of willow, aspen, alder, birch and other shrubs or low trees of riparian habitats, once heavily browsed, erupted after mastodon extinction. As a result, the fires of a dry spring swept through more eastern forests than otherwise might have occurred, accounting for the postglacial "B" zone with its abundant charcoal and dominance of pine pollen. Other shifts in details of plant community abundance can be anticipated after large mammal extinction throughout the Americas, an event more gradual and less severe in Europe and Asia.

The pollen records of the Old World may not be independent of megafauna, as Vera shows in his account of wisent, roe deer, and other European large mammals. Recently, American pollen analysts have begun speculating on details of the pollen record in the late glacial, a record some botanists prefer to take at face value. Work by Guy Robinson and Dave Burney in New York State suggests that change in low tree-shrub taxa, such as *Alnus*, *Betula*, *Populus*, and *Salix*, may reflect post-extinction release from herbivory of riparian woody shrubs that helped to fuel the unusual fires of the B (pine) zone in classical North American pollen profiles. In the past, plant ecologists happily ignored large mammals of which few were left to consider in America after 13,000 years ago. With a larger number of medium- to large-size mammals in the lateglacial and postglacial of Europe, pollen analysts may revise the approach to forest dynamics, traditionally the purview of paleobotanists preoccupied with pollen diagrams and climate change, by considering the long neglected dynamic role of Europe's mammoth, giant deer, and other large mammals.

American bison expanded eastward beginning in the 1500s and retreated in the last few hundred years. Certain geographers and anthropologists attribute the pulse to a crash in populations of Native Americans east of the Mississippi. Apparently this followed the introduction of smallpox and other Old World diseases accompanying conquest.

To turn to the undergraduate curriculum of Yale, Harvard, George Mason and other flagship liberal arts schools, is there a unit or even a survey course on the environment, one suitable for non-science majors? The ingredients for a course including global climatic change can be found in the last chapter of Bell and Walker.

The need of more knowledge in that direction is apparently acute in most state legislatures, the halls of Congress, and the cubby holes of the White House, not to mention business majors in America's institutions of higher education, Ivy League included. Ecologist and American Association for the Advancement of Science President Paul Sears once left Oberlin to teach at Yale. Such talent may be needed in schools of government and commerce, now more than ever.