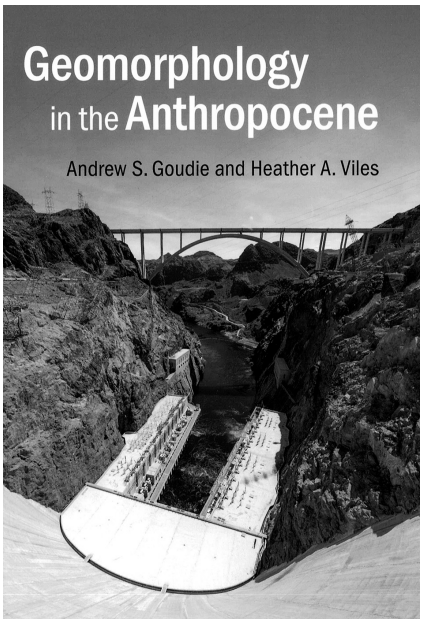
Geologos 23, 2 (2017): 137–138
doi: 10.1515/logos-2017-0015

GEOLOGOS

Book reviews

Geomorphology in the Anthropocene, by A.S. Goudie and H.A. Viles, 2016. Cambridge University Press, Cambridge. 324 pages. Hardback. Price GBP 39,99, ISBN 978-1-107-13996-1



Geomorphologists today agree that the impact of human activities on the Earth's surface is profound and manifests itself in different ways, i.e., from direct intervention leading to anthropogenic landforms, through indirect impact such as creating a milieu to processes that would not have occurred otherwise (e.g., rill erosion on bare soils or deflation on deforested sand sheets), to acceleration of natural processes due to global environmental change, particularly well seen at high latitudes. There are many publications that explore human impact on landforms and processes, but surprisingly few of these are up-to-date synthetic works. The present tome aims to fill this gap and links two hotly debated issues in contemporary geosciences. The first one is the role that humans play in changing terrestrial morphology, as analysed in a long-term context, ever since their emergence and early alterations of environment by deliberately setting fires. The second is the concept of the Anthropocene, i.e., a distinct time interval in recent geological history during which the impact of mankind surpasses the effects of the majority of natural processes. The authors, both professors at the University of Oxford with a long-held interest in nature-human interactions, now make an important contribution to this debate, assembling vast and varied evidence of geomorphological change that would not have occurred had humans not been present. However, they also show that the effects of human presence greatly vary in time and space and that human impact does not necessarily increase everywhere, so that the search for a clearly defined, unambiguously agreed onset of the Anthropocene may be futile.

The book is an excellent review of the variability of human impact, with the framework chosen being analogous to that of most textbooks on geomorphology, i.e., groups of processes are discussed one by one. The difference with most textbooks is that the present tome starts by emphasising the direct role of people rather than by concluding with this notion. Thus, after a brief but very useful introduction (Chapter 1), in which terminological and conceptual issues associated with the Anthropocene and Anthropogeomorphology are discussed, a multitude of anthropogenic drivers of geomorphological change are presented (Chapter 2). This is followed by an examination of anthropogenic landforms (Chapter 3) such as artificial islands and reefs, reclaimed coastal lands, hillslope terraces, mounds, embankments, mine dumps, collieries, explosion craters, tunnels and canals. Wherever possible, descriptions are backed up by quantitative data, which is very helpful in full appreciation of the geomorphological prowess of mankind. The remaining chapters focus on indirect effects of human presence and activities, starting from ground subsidence (Chapter 4). Although the resultant landforms may not be distinguishable from naturally triggered subsidence, the role of man's activities in causing subsidence, both as local catastrophic collapses and, more regional, as gradual ground lowering, is indisputable as becomes clear from examples

from various parts of the world. Chapter 5 explores weathering processes in the Anthropocene and includes an attempt to predict how weathering rates may respond to future climate change, a theme rarely addressed. Chapter 6 revolves around hillslope processes, examined from different perspectives: triggers of change (grazing, deforestation), erosion rates, process variability related to different uses of land, erosion management, accelerated sedimentation and mass movements. Again, the chapter ends with considerations of future slope instabilities. In Chapter 7 the focus shifts to rivers whose discharge and sediment transport regimes are shown to be significantly modified by catchment-wide human activities. Outlined are more obvious changes such as channel transformations, buildups of alluvium and accelerated incision. In conclusion, the authors discuss how water levels in lakes change in response to anthropogenic interventions and how they will do so in the future. Chapter 8 examines aeolian processes and landforms, inclusive of an increase in the frequency of dust storms, a reactivation of active dunes; this is followed by Chapter 9 on coastal change, encompassing beach and delta erosion, coral reef decline, siltation of estuaries and alterations of salt marshes. Given the coverage of the issue in popular media, it is not surprising that the effects of projected sea level rise are extensively discussed. Global warming may also have effects in areas with permafrost and ice cover, as outlined in Chapter 10. Geomorphological change in front of retreating glaciers is given particular attention. The closing Chapter 11 explores more general relationships between human activity and geomorphology, evaluated within the temporal context of three distinct periods in the Anthropocene: early modifications, industrial revolution and great acceleration, and stewardship. The book ends with an extensive reference list that covers nearly 70 pages and is a mine of information on other studies of the subject.

To conclude, the reader receives an excellent, comprehensive and illuminating treatment of the role of humans in transforming the morphology of the Earth. The scale and diversity of interactions and modifications are shown to be enormous. Having read the book one will have little doubt that in the realm of geomorphology the recognition of the Anthropocene is fully justified. Moreover, 'Geomorphology in the Anthropocene' should become a necessary companion to any standard geomorphology textbook, in order to highlight changes and drivers that are rarely addressed explicitly. The authors are to be congratulated on this achievement.

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