

Edited by Jennifer Sills

Time for a data revolution in China

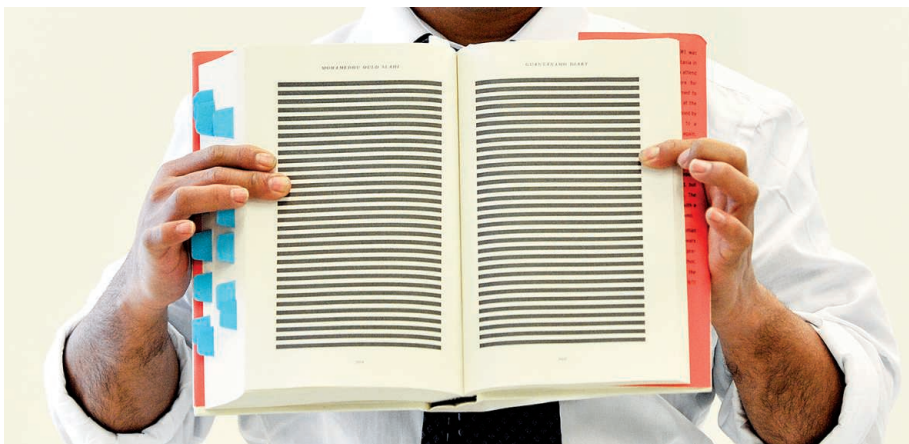
IN MARCH 2015, China's Premier Keqiang Li proposed that government data should be open to the public (1). This offers some hope for data sharing in China. How to put the advocacy of openness into practice, however, remains challenging.

According to the UN Secretary General's Independent Expert Advisory Group on a Data Revolution for Sustainable

to declare even relatively innocuous data as state secrets. This is partly because the rule set for classified information is not clear in the "Open Government Information Regulations," which went into effect in May 2008 (4). Reasons for low data openness include, among others, fear that government data tampering will be uncovered; recognition that data gathering methods are often faulty; fear of retribution for release of data from higher officials; the power accrued from access to information; and the desire on the part of data holders to gain some benefit in return for access.

To make government data more easily and widely available, several things need to happen. First, bureaucrats need to understand that open data can benefit the

- Group on a Data Revolution for Sustainable Development, "A World that counts: Mobilising the data revolution for sustainable development" (2014); www.undatarevolution.org/report/.
- A. Hsu, A. de Sherbinin, H. Shi, *Environ. Dev.* **3**, 39 (2012).
 - State Council of P.R. China, "Regulations of the People's Republic of China on Open Government Information" (2007); www.most.gov.cn/yw/200704/t20070424_43317.htm [in Chinese].
 - Examples include Xue Feng, a Chinese-American geologist who was sentenced to 8 years in prison because he had obtained data on the locations of Chinese oil wells (6); Zheng Sun, an officer from the National Bureau of Statistics of China who was sentenced to 6 years in prison because he released gross domestic product and consumer price index data (7); Zhiwen Wu, a Ph.D. in economics who was sentenced to 5 years and 6 months in prison because he shared data with others (8); and possibly Gao Yu, who was sentenced to 7 years in prison because she shared government information (9).
 - M. Hviistendahl, *Science* **339**, 384 (2013).
 - D. Guoyuan, "National Bureau of Statistics official who leaked important economic data is sentenced" (2011); <http://news.qq.com/a/20111024/001187.htm> [in Chinese].
 - "Ph.D. in economics who leaked the country's economic data 144 times sentenced to 5 and a half years" (2012); <http://news.sohu.com/20120331/n339468955.shtml>.
 - H. Pin, "Gao Yu's real crime," *New York Times* (15 April 2015); <http://cn.nytimes.com/opinion/20150415/c15ho/en-us/>.



Government data sharing in China remains limited.

Development, the data revolution is composed of, among other things, two major developments: big data and open data (2). Government census and survey data can be major engines for transparency and innovation. They cover continuous time periods, large areas, and diverse groups. Open government data benefits scientific research, economic development, environmental management, social justice, and political decision-making. However, government data sharing is very limited in China (3). Much data, ranging from social statistics to the results of environment and resource surveys, are kept from the public. The potential of these data is largely untapped because they are released only in highly aggregated forms, meaning that spatial and temporal patterns cannot be examined. In addition, insufficient information is provided on the data gathering methods.

Poor government data accessibility also affects data sharing between individuals, industry sectors, and organizations, and even between different government sectors in China. This results in redundant data collection efforts. Chinese officials are quick

economy, the environment, public participation, and decision-making. Second, there needs to be a clearer legal definition for what information needs to be classified, so that this decision is not left up to the discretion of data holders. Third, if data are released in compliance with the policy, individuals should not be penalized for sharing information (5). Finally, China should comply with international standards of data collection, documentation, maintenance, and disclosure.

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- The Secretary-General's Independent Expert Advisory

Qualifying pollinator decline evidence

THE POLLINATION CRISIS has garnered perhaps more public interest than any other environmental problem short of climate change. It is therefore remarkable that it is based on such limited science. D. Goulson *et al.* ("Bee declines driven by combined stress from parasites, pesticides, and lack of flowers," *Review*, 27 March, p. 1435; published online 26 February) acknowledge that evidence for pollinator declines is almost entirely confined to honey bees and bumblebees in Europe and North America. Yet they conclude that "it is probably reasonable to assume that declines are also occurring elsewhere across the globe." This is a possibility, but not one that can be well justified by current evidence. Their statement extrapolates data from north temperate bumblebees (a single and rather unrepresentative clade), which include less than 0.6% of the 20,000 worldwide bee species. The data are also derived from among the most intensively farmed landscapes in the world. Concern about future food insecurity due to pollinator losses rests on this shaky foundation, despite, as yet, any sign of declining crop production (1, 2).

Goulson *et al.* also bemoan minimal uptake of pollinator-promoting incentives on farmland. They attribute this to insufficient understanding among farmers of the economic benefits of pollinators. I expect, however, that farmers are more familiar with the economics of farming than ecologists. Although pollinators might elevate crop production, this has to be set

in the context of other farm management interventions (3). It is difficult to envisage a more pollinator-dependent crop than Californian almonds, which Goulson *et al.* suggest are threatened by continuing honey bee decline. Yet, the 60-year decline of honey bees has been paralleled by increasing almond production and associated profits (4). The most productive years have been the past five (2010 to 2014) when honey bee colonies have been at their lowest since records began in 1947 (5).

We should make every effort to harness the public interest in pollinators to emphasize the value of, and need for, conservation. In doing so, we should not, however, blind ourselves to the limitations of our own data.

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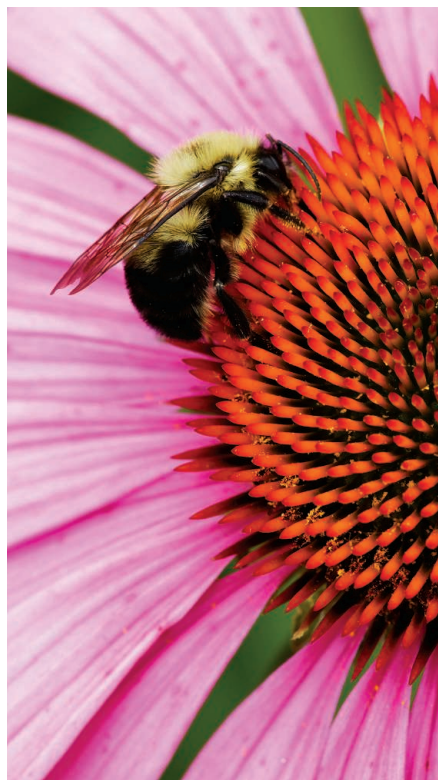
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Response

GHAZOUL IS ACCURATE in pointing out that we have no population data on the majority of pollinators, that the data we do have are biased toward a small number of taxa (bumblebees, honey bees, and butterflies), and that data are far better for Europe and North America than for elsewhere. These points are made very clearly in our original manuscript. Of course, one could make this same statement about insects in general, or indeed about all biodiversity, yet few doubt that there really is a biodiversity crisis. If we were to wait until we had good population data for all pollinators [note that there are an estimated 1600 pollinators in the United Kingdom alone (1)] before taking action to conserve them, then we would be waiting a long time indeed.

Of course, data do exist for other regions. For example, bumblebee declines are occurring in Asia and South America (2, 3), as described in our manuscript. Data also exist for other species. The recent IUCN red data list for European bees (4) examines all 1965 European bee species, and concludes that about 287 of these are "threatened" or "near threatened," while noting that insufficient data were available to make any judgment for 1101 species. They also note that 37% of the 407 species for which there is information on population change are in decline.

Ghazoul argues that the data for declines in pollinators are largely based on social



bees, which may be unrepresentative of the majority of bees. This is true, but we should bear in mind that in the temperate Northern Hemisphere (which makes up a large proportion of the global landmass), bumblebees and honey bees are the predominant pollinators for a great many crops and wildflowers, being generally far more numerous than other bee species [e.g., (5, 6)]. Of course, this is not to deny the important role played by many other insects in pollination.

Finally, Ghazoul criticizes our mention of the California almond industry, in which we say "should honey bee stocks in North America fall much further, the viability of almond production in California would be threatened." He argues that there is no reason to suppose that the pattern of increased yield (gained by planting larger areas), despite falling honey bee numbers, will not continue. By inference, he is suggesting that this broadly applies to the future for insect-pollinated crops. This would be a remarkably optimistic interpretation of the situation.

What we probably can agree on is that there is an urgent need for long-term monitoring of pollinators at an international scale so that we have hard data on the pattern and extent of declines, a challenge that the global community of researchers has so far failed to tackle.

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TECHNICAL COMMENT ABSTRACTS

Comment on "Evidence for mesothermy in dinosaurs"

M. D. D'Emic

Grady *et al.* (Reports, 13 June 2014, p. 1268) suggested that nonavian dinosaur metabolism was neither endothermic nor ectothermic but an intermediate physiology termed "mesothermic." However, rates were improperly scaled and phylogenetic, physiological, and temporal categories of animals were conflated during analyses. Accounting for these issues suggests that nonavian dinosaurs were on average as endothermic as extant placental mammals.

Full text at <http://dx.doi.org/10.1126/science.1260061>

Comment on "Evidence for mesothermy in dinosaurs"

Nathan P. Myhrvold

Grady *et al.* (Reports, 13 June 2014, p. 1268) studied dinosaur metabolism by comparison of maximum somatic growth rate allometry with groups of known metabolism. They concluded that dinosaurs exhibited mesothermy, a metabolic rate intermediate between endothermy and ectothermy. Multiple statistical and methodological issues call into question the evidence for dinosaur mesothermy.

Full text at <http://dx.doi.org/10.1126/science.1260410>

Response to Comments on "Evidence for mesothermy in dinosaurs"

John M. Grady, Brian J. Enquist, Eva Dettweiler-Robinson, Natalie A. Wright, Felisa A. Smith

D'Emic and Myhrvold raise a number of statistical and methodological issues with our recent analysis of dinosaur growth and energetics. However, their critiques and suggested improvements lack biological and statistical justification.

Full text at <http://dx.doi.org/10.1126/science.1260299>