

Supplementary Material

The emergence of birdwatching in China: history, demographics, activities, motivations, and environmental concerns of Chinese birdwatchers

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Appendix S1. First online questionnaire placed onto website Surveygizmo (www.surveygizmo.com) on 27 May 2012, with the final responses submitted on 28 August 2012 (n = 296 respondents). All questions are first given in the original Chinese, and then translated into English by AW. If the results were numerical, we first give the number of respondents, and then the percentage of the total number of respondents in brackets. For those cases where it made sense, we then ordered the responses from the highest to the lowest ranking. \$ = the answers were ranked using the total scores which is the sum of all weighted rank counts. * = answers are summarized in the main text.

中国的观鸟者 Chinese Birdwatchers

您好！首先感谢各位的协助。我是剑桥大学中文系的学生。我现在开始毕业论文的研究，论文的话题是关于中国的观鸟者，观鸟在中国为何越来越流行，以及这种趋势是否代表着社会中更广泛的意识变化。本调查的目的在于了解您们观鸟的背景及兴趣，以期建立研究的基础。该问卷不记名，请如实回答。耽误您宝贵的时间，再次向您致谢！

Hello! Let me first thank you for your help. I am a student of Chinese Studies at the University of Cambridge, and I am currently in the process of starting research for my final-year dissertation on Chinese birdwatchers, why birdwatching in China is becoming more and more popular, and whether this trend represents a shift in wider conceptions of nature. The purpose of this survey lies in understanding the backgrounds and interests of Chinese birdwatchers, forming a basis for further research. This survey is completely anonymous; please answer all questions honestly. Thank you so much for taking the time to fill in this survey!

S1.1 您的性别: Sex:

- 男 Male – 199 (67.2%)
- 女 Female – 97 (32.8%)

S1.2 您的年龄: Age:

- 25 岁以下 25 and below – 75 (25.3%)
- 26 岁-35 岁 26-35 – 74 (25.0%)
- 36 岁-45 岁 36-45 – 80 (27.0%)

- 46岁-55岁 46-55 – 38 (12.8%)
- 56岁-65岁 56-65 – 23 (7.8%)
- 65岁以上 65 and above – 6 (2.0%)

S1.3 您居住的城市/省份: Which province do you live in?

- 北京 Beijing municipality – 91 (30.7%)
- 福建 Fujian – 46 (15.5%)
- 湖北 Hubei – 25 (8.4%)
- 上海 Shanghai municipality – 23 (7.8%)
- 浙江 Zhejiang – 22 (7.4%)
- 四川 Sichuan – 13 (4.4%)
- 广西 Guangxi – 12 (4.1%)
- 江苏 Jiangsu – 11 (3.7%)
- 广东 Guangdong – 9 (3.0%)
- 山东 Shandong – 7 (2.4%)
- 其他 Other provinces – 37 (12.5%)

S1.4 您的学历: Educational background:

- 初中 Middle school – 6 (2.0%)
- 高中 High school – 10 (3.4%)
- 中专 Vocational college – 20 (6.8%)
- 大学 University – 190 (64.2%)
- 硕士 Master's degree – 50 (16.9%)
- 博士 PhD – 20 (6.8%)

S1.5 您所从事的工作/学业与环保或生物学有关吗? 如果相关的话, 请说明如何有关. Is your profession related to conservation or biology?

- ? Yes – 111 (40.2%)

- ? No – 165 (59.8%)

S1.6 您观鸟多久了? How long have you been birdwatching?

- 1 年以内 Less than one year – 41 (13.9%)
- 1-2 年 1-2 years – 64 (21.7%)
- 2-5 年 2-5 years – 104 (35.3%)
- 5-10 年 5-10 years – 63 (21.4%)
- 10 年以上 Over 10 years – 23 (7.8%)

S1.7 您多久去观赏一次鸟类? How often do you go birdwatching?

- 每个星期至少一次 At least once a week – 92 (31.3%)
- 每两个星期至少一次 At least once every two weeks – 65 (22.1%)
- 每个月至少一次 At least once a month – 74 (25.2%)
- 每个季度至少一次 At least once every three months – 34 (11.6%)
- 偶尔 Occasionally – 29 (9.9%)

S1.8 您最初是怎么开始观鸟的 ? How did you start birdwatching? (Select all that are applicable)

- 由朋友/同事介绍 Introduced by a friend/colleague – 75 (25.7%)
- 通过网络得知 Introduced by the internet – 71 (24.3%)
- 因为与工作/学业有关而得知 Because of connections with work or study – 66 (22.6%)
- 通过媒体得知 Introduced by the media – 25 (8.6%)
- 由亲戚介绍 Introduced by a relative – 3 (1.0%)
- 其它 Other – 81 (27.7%)

S1.9 您观鸟主要的原因是什么? 请按照重视度从 1 到 10 排序(1 为最重要的) What are your major reasons for birdwatching? Please order the following reasons from 1 to 10 (1 being the most important). Drag items from the left-hand list into the right-hand list to order them. \$

- 欣赏鸟类 To appreciate birds – total score 1884 (rank 1)

- 了解鸟类和生态系统 To understand birds and ecology – total score 1662 (rank 2)
- 放松 To relax – total score 1611 (rank 3)
- 看到尽可能多的鸟类物种 To see as many bird species as possible – total score 1553 (rank 4)
- 欣赏乡间的景色 To appreciate natural scenery – total score 1479 (rank 5)
- 运动 To exercise – total score 1469 (rank 6)
- 拍照 To do photography – total score 1456 (rank 7)
- 进行研究/监控的工作/活动 To conduct research/monitoring – total score 1300 (rank 8)
- 交友 To make friends – total score 1258 (rank 9)
- 带孩子走进自然 To introduce children to nature – total score 1257 (rank 10)

S1.10 您曾经给环保的慈善机构捐款吗？ 如果捐过的话， 您多久捐一次？ Have you ever donated money to a conservation charity? If so, how often?

- 没有 Never – 191 (67.0%)
- 捐过一次 Donated once – 24 (8.4%)
- 捐过几次 Donated a few times – 58 (20.4%)
- 每年捐一次 Donate annually – 9 (3.2%)
- 每年捐几次 Donate several times annually – 3 (1.1%)

S1.11 您目前对相关部门/政府对待环保及保护濒危物种的措施觉得满意吗? 不满意的话, 您对哪些方面特别不满意? Are you satisfied by current efforts by the government and authorities to protect endangered species? If you are not satisfied, what are you unsatisfied with? *

S1.12 您对下面哪些问题产生担心？ （选择所有符合您的选项） Which of the following issues are you concerned about? (Select all that are applicable)

- 环境/栖息地破坏 Degradation of the environment/habitats – 274 (93.8%)
- 污染 Pollution – 243 (83.2%)
- 偷猎/采集药物 Hunting/collection – 199 (68.2%)
- 濒危物种 Endangered species – 183 (62.7%)

□ 全球变暖 Global warming – 111 (38.0%)

S1.13 您如果愿意进一步为本论文提供帮助(如接受采访等), 请写出您的邮箱. 我特别需要跟观鸟会的会长沟通. 谢谢您的帮助. If you would like to help further (such as doing interviews, etc.), please provide your email address. I am particularly hoping to speak to leaders of birdwatching societies. Thank you for your help.

Appendix S2. Second online questionnaire placed onto website Surveygizmo (www.surveygizmo.com) on 4 January 2013, with the final responses submitted on 12 March 2013 (n = 280 respondents). All questions are first given in the original Chinese, and then translated into English by AW. If the results were numerical, we first give the number of respondents, and then the percentage of the total number of respondents in brackets. For those cases where it made sense, we then ordered the responses from the highest to the lowest ranking.

您好！首先感谢各位的协助。我是剑桥大学中文系的学生。我现在研究毕业论文，论文的话题是中国的观鸟者。该问卷不记名，请如实回答。耽误您宝贵的时间，再次向您致谢！（您如果以前填写过相似的调查，道歉耽误您的时间：两个问卷不一样，都在研究中起着重要的作用！本问卷比以前的更短。感谢您持续的支持）

Hello! Firstly, thank you for your help. I am a student of Chinese Studies at Cambridge University, currently in the process of conducting research for my final-year dissertation on birdwatching in China. This survey is completely anonymous. Thank you so much for taking the time to fill in the survey! (If you have previously filled in a similar survey, I apologize for taking up your time once again. The two surveys are different, and both are important for my research. This survey is shorter than the previous one. Thank you for your continued support.)

S2.1 您的性别: Sex:

- 男 Male – 191 (68.2%)
- 女 Female – 89 (31.8%)

S2.2 您的年龄： Age: Mean: 34.4 years; median: 31 years; range: 10-71 years; 121 (44%) were < 30 years old.

S2.3 您的学历： Educational background:

- 初中 Middle school – 7 (2.5%)
- 高中 High school – 8 (2.9%)
- 中专 Vocational college – 7 (2.5%)

- 大学 University – 185 (66.8%)
- 硕士 Master's degree – 51 (18.4%)
- 博士 PhD – 19 (6.9%)

S2.4 您的家庭年总收入： Your average annual household income:

- 20,000 元以下 Less than 20,000 – 44 RMB (16.1%)
- 20,000-40,000 元 20,000-40,000 RMB – 46 (16.8%)
- 40,000-60,000 元 40,000-60,000 RMB – 40 (14.6%)
- 60,000-80,000 元 60,000-80,000 RMB – 33 (12.0%)
- 80,000-100,000 元 80,000-100,000 RMB – 35 (12.8%)
- 100,000 元以上 Over 100,000 RMB – 76 (27.7%)

S2.5 您是任何观鸟协会的会员吗？ Are you a member of any birdwatching society?

- 是 Yes – 138 (49.5%)
- 不是， 但是与协会交流过 No, but I have had contact with a birdwatching society – 48 (17.2%)
- 不是， 但是与环保有关协会的会员 No, but I am a member of other conservation organizations – 28 (10.0%)
- 不是， 但是正在考虑加入 No, but I am considering joining – 26 (9.3%)
- 不是 No – 39 (14.0%)

S2.6 您观鸟多久了？ How long have you been birdwatching?

- 1 年以内 Less than a year – 54 (19.4%)
- 1-2 年 1-2 years – 59 (21.2%)
- 2-5 年 2-5 years – 89 (31.9%)
- 5-10 年 5-10 years – 57 (20.4%)
- 10 年以上 Over ten years – 20 (7.2%)

S2.7 您最初是怎么开始观鸟的? How did you start birdwatching? How did you start birdwatching?

(Select all that are applicable)

- 通过学校里的活动得知 (课程, 老师, 课外活动等) Introduced by an event in school/college (e.g., courses, teacher, field trip, etc.) – 66 (24.3%)
- 因为与工作/学业有关而得知 Through connections with work or study – 65 (23.9%)
- 通过由观鸟会举办的活动得知 Introduced by an event held by a birdwatching society – 60 (22.1%)
- 由朋友/同事介绍 Introduced by a friend/colleague – 53 (19.5%)
- 通过网络得知 Introduced by internet – 51 (18.8%)
- 通过传媒得知 Introduced by media – 23 (8.5%)
- 由亲戚介绍 Introduced by a relative – 4 (1.5%)

S2.8 您多久参与一次下面的活动? How often do you take part in the following activities?

- 未参与过 Never
- 参与过一次 Once
- 参与过几次 A few times
- 每年参与至少一次 At least once a year
- 每个季度参与至少一次 At least once every three months
- 每两个星期参与至少一次 At least once every two weeks
- 每个星期参与至少一次 At least once a week

任何观鸟活动 (包括观鸟会举办的和自主的在内) Birdwatching activities (including those organized by a society or alone) – 67.8% (The percentages given for this question are the percentage of people who did the respective activity at least once a year.)

公众宣传教育活动 Public education activities – 39.9%

观鸟普及活动 Birdwatching popularization – 39.8%

鸟类/其他科学调查 Ornithological/scientific surveys – 32.4%

鸟类救助 Bird rescue – 14.4%

S2.9 你参与的观鸟活动如何？ 您多久参与一次下面的观鸟活动 How often do you participate in the following activities?

- 未参与过 Never
- 参与过一次 Once
- 参与过几次 A few times
- 每年参与至少一次 At least once a year
- 每个季度参与至少一次 At least once every three months
- 每两个星期参与至少一次 At least once every two weeks
- 每个星期参与至少一次 At least once a week

一个人观鸟 Birdwatching alone – 89.9% at least once a year, 61.2% at least once every three months

跟几个朋友或亲戚一起观鸟 Birdwatching with a few friends or family – 62.8% at least once a year, 51.7% at least once every three months

大型的观鸟活动 Large-scale birdwatching activities – 72.0% at least once a year, 18.8% at least once every three months

由观鸟会举办的观鸟活动 Birdwatching activities organized by a society – 78.1% at least once a year, 22.7% at least once every three months

自主的观鸟活动 Self-organized birdwatching activities – 91.7% at least once a year, 57.4% at least once every three months

在离家不到一公里的地方观鸟 Birdwatching less than one kilometre from home – 60.0% at least once a year, 52.7% at least once every three months

在您所住的城市乡村观鸟 Birdwatching within your town or city – 66.2% at least once a year, 56.7% at least once every three months

在您所住的省份其它地方观鸟 Birdwatching within your province – 51.4% at least once a year, 30.1% at least once every three months

在其它国家观鸟 Birdwatching abroad – 22.3% at least once a year, 10.5% at least once every three months

S2.10 您观鸟的主要原因是什么？ 请选择每个答复的重要程度， 10 为非常重要，1 为一点也不重要 What are your major reasons for birdwatching? Please select the importance of the following motivations, 10 being extremely important, and 1 not at all important.

欣赏鸟类的美丽 Appreciating birds' beauty – 8.18

了解鸟类和生态系统 Understanding birds and ecology – 7.66

放松 Relaxing – 7.57

看到尽可能多的鸟类物种 Seeing as many bird species as possible – 7.54

为环保作出贡献 Contributing to conservation – 7.21

欣赏乡间的景色 Appreciating the countryside – 7.09

运动 Exercising – 7.06

交友与鸟友交流 Contact with other birdwatchers – 6.55

拍照 Pursuing photography – 5.99

为鸟类科学作出贡献 Contributing to science and ornithology – 5.79

S2.11 在 2012 年，你估计花费了多少钱在这个爱好上？ （包括旅行费，设备，协会会费等）

How much would you estimate you spent on birdwatching during 2012? (including, e.g., travel expenses, equipment, membership fees, etc.)

- 500 元以下 Less than 500 RMB – 66 (24.1%)
- 500-1000 元 500-1000 RMB – 49 (17.9%)
- 1000-5000 元 1000-5000 RMB – 62 (22.6%)
- 5000-10,000 元 5000-10,000 RMB – 42 (15.3%)
- 10,000 元以上 Over 10,000 RMB – 55 (20.1%)

S2.12 您曾经给环保的慈善机构捐款吗？ 如果捐过的话， 您多久捐一次？ Have you ever donated money to a conservation charity? If so, how often?

- 没有 Never – 159 (57.2%)
- 捐过一次 Once – 38 (13.7%)

- 捐过几次 A few times – 65 (23.4%)
- 每年捐一次 Once annually – 8 (2.9%)
- 每年捐几次 Several times annually – 8 (2.9%)

S2.13 您如果没有给环保慈善机构捐过款或者很少捐款，您主要的原因是什么？请选择每个答复的重要程度，10为非常重要，1为一点也不重要 If you have never donated to a conservation charity, what are your major reasons? Please select the importance of the following reasons, 10 being very important, and 1 not at all important.

慈善机构的影响力不足 The charities don't have enough influence – 6.48

您对慈善机构的信任程度不够高 You don't trust the charities enough – 6.45

慈善机构的效率不足 The charities are inefficient – 6.07

您不知道怎么捐款，或者捐款的过程太难/复杂 You don't know how to donate, or it's too complicated/difficult – 5.77

您所住的地方没有环保慈善机构，至少您没听过 There are no conservation charities where you live, or you haven't heard of any – 5.47

您没有多余的钱 You don't have any enough money to donate – 4.77

当地的慈善机构不能接受捐赠 Local charities can't accept donations – 3.50

慈善机构不需要捐款 Charities don't need donations – 3.27

S2.14 您对下面系列环境问题的担心程度是怎么样的？请选择你担心每个问题的程度（1为不担心，10为非常担心） How worried are you about the following issues? Please select every issue that you are concerned about (1 being not at all worried and 10 extremely worried).

环境/栖息地的破坏 Environmental/habitat degradation – 9.36

污染 Pollution – 9.17

现有的环保法律的效率/严格率不足 Implementation of environmental law is ineffective/too lenient – 8.99

与饭馆需求有关的猎杀 Hunting for the restaurant trade – 8.66

公众对环保的关注度/意识不足 The public don't know/care enough about conservation – 8.64

环保法律不足 Environmental laws are insufficient – 8.54

人口过多 Overpopulation – 7.84

因为中药的需求而产生的猎杀 Hunting for Chinese medicine – 7.20

S2.15 您觉得下面系列声明的正确程度如何？ 请选择正确程度， 1 为一点也不正确， 10 为非常正确 How much do you agree with the following statements? Please select your level of agreement, 1 being completely disagree and 10 completely agree.

一般来说, 中国人跟 20 年前比起来现在有更多休闲时间可以放在爱好上(如观鸟) Generally speaking, Chinese people have more time to devote to leisure (such as birdwatching) today, compared to 20 years ago – 7.76

观鸟这个爱好在中国越来越流行 Birdwatching is becoming more popular in China – 7.51

公众对鸟类和环保的意识和了解越来越好 Public awareness and understanding of birds and environmental issues is improving – 7.34

观鸟会和观鸟爱好者本身拥有影响公众的态度和意识的的能力 Birdwatching societies and birdwatchers themselves have the ability to influence public awareness – 7.20

您对中国鸟类的未来感觉乐观 You are optimistic about the future of China's birds – 6.37

观鸟会和观鸟爱好者本身拥有影响法律的实施的能力 （比如报警违法行为， 保证法律实施得严格） Birdwatching societies and birdwatchers themselves have the ability to influence implementation of the law (eg reporting illegal behaviour, ensuring the law is implemented strictly) – 6.22

Appendix S3. The Chinese terms translated in the main manuscript and the appendices in the order in which they appear.

Chinese term	English translation
Main manuscript	
中国观鸟：论坛	China Birdwatch Forum
中国工薪阶层人均收入不到世界一半	China's wage levels are less than half of the global average
中国鸟类野外手册	A field guide to the birds of China (MacKinnon et al. 2000)
2010年第六次全国人口普查主要数据公报	Communiqué on the major statistics from the 2010 national census
Appendices	
詩經	Book of Songs
‘溜鸟’	walking with cage birds
本草綱目	Compendium of Materia Medica
鳳凰	Chinese phoenix
中国鸟类区系纲要	A synopsis of the avifauna of China
东北鸟类图鉴	A field guide to the birds of Northeast China
中国鸟类图鉴	Atlas of birds of China
中國野鳥圖鑑	A field guide to the birds of China (Yen et al. 1996)
自然之友野鸟会	Friends of Nature Wild Bird Society
生物多样性	biodiversity
环境保护	environmental protection
观鸟	birdwatching
国家林业局	State Forestry Administration
社会团体登记管理条件	Regulations for the Administration and Registration of Social Organizations
民政部	Ministry of Civil Affairs
跑来跑去为只鸟	Running around for a bird

中国鸟类纪录中心	China Bird Report
中国内地观鸟活动的发展与现状	The development and current status of birdwatching activities in China
大自然	China Nature
哀鸿道	The road of mournful birds
中国观鸟的十年	Ten years of birdwatching in China
国家林业局紧急部署制止湖南等地猎杀候鸟违法行为	The National Forestry Bureau is urgently deploying authorities to stop the illegal hunting of migrant birds in Hunan and elsewhere
关于迪斯尼勺嘴鹬保育项目	About Disney's Spoon-billed Sandpiper Protection Programme
湖南成立全国首支候鸟保护专门队伍	Hunan establishes the first 'Bird Protection Troops' in the country
中国照相机工业 30 年历史大回顾	A review of the 30-year history of China's camera industry
双筒望远镜的国内外市场状况及其发展趋势	The current state of and development trends in the binoculars market in China and abroad
光学技术	Optics Technology
中华人民共和国劳动法	Labour Law of the People's Republic of China
2000 年第五次全国人口普查公报	Communiqué on the 2000 national census
2011 年国民经济继续保持平稳较快发展	The nation's economy continued to grow quickly and steadily in 2011

Appendix S4. Appreciation, use, and scientific study of birds in historical times.

Appreciation and use of birds in historical times

Besides providing food (e.g., Kamp *et al.* 2015) and medicine (e.g., Read 1932) and being used for hunting and sport, e.g., cormorant fishing (Dong *et al.* 2007), falconry (Ma 2013), bird pest control (Yang 2015), insect pest control (Cheng 1964, Boswall 1989), and pigeon keeping (Boswall 1986b), birds have featured in artistic and symbolic traditions for millennia, particularly in the ‘bird and flower paintings’ which peaked during the Song dynasty (~ 960 - 1279) (Munsterberg 1981). However, legendary or imagined species were often as prominent as native birds (Fan 2004). The [Book of Songs], a collection of poetry from around 1000-700 BC, mentions 35 different bird species (Xu 1989). Mandarin ducks, cranes and magpies, which are symbolic of love, longevity, and auspiciousness, respectively, are prominent throughout classical Chinese culture (Cheng 1979, Eberhard 1986, Dong *et al.* 2007, Ma *et al.* 2013). Hundreds of species have also been kept as cage birds for their beauty and song, and the practice of [walking with cage birds] has been a popular pastime for centuries in northern China (Cheng 1979, Ma *et al.* 2013). For about 2000 years, kingfisher feathers have been used as an inlay for fine art objects and adornment, e.g., hairpins, headdresses, fans, panels and screens (Wikipedia 2015). Two thousand years ago, the emperor even introduced laws to protect birds during spring and summer (Boswall 1988). Clearly, China has a long-standing tradition of appreciation of birdlife.

Ornithology in historical times

Birdwatching is defined as “the act of observing and identifying birds in their native habitats,” thereby excluding activities such as viewing a captive bird or observing a bird without attempted identification (Sekercioglu 2002). However, prior to the pioneering work of a few scientists in the 19th century, China’s avifauna had not been described or catalogued and thus could not have been identified in the wild.

The closest approximation of a modern field guide in pre-20th century China is the [Compendium of Materia Medica] published in 1590 which is a compendium of plants and animals along with their supposed medicinal properties (Fan 2004). While it contains some illustrations, only about a dozen of China’s more than 700 passerine species are illustrated while mythical birds, e.g., the [Chinese phoenix], are also included. The Compendium’s purpose was obviously not species-level identification. Unlike the scientific emphasis on identification and classification exemplified by Linnaeus’ pioneering work,

Chinese scholarly responses to the natural world in pre-20th century China focused instead on medicinal, symbolic and divinatory significance (see also Sterckx 2002, Nappi 2009). Indeed, no indigenous disciplines equivalent to the concepts of ‘ornithology’ or even ‘natural history’ existed (Fan 2004).

A list of species against which wild birds could be identified did not appear until Western ornithologists such as Father (or Père) Jean Pierre Armand David (1826-1900), Nikolai Przhevalsky (1839-1888) and Robert Swinhoe (1836-1877) catalogued the majority of China’s birds (Meyer de Schauensee 1980, MacPherson 2000, Collar 2004, Fan 2004, Walters 2005). Ornithological studies continued into the early 20th century, including the first generation of Chinese ornithologists who had been trained abroad. The most prominent was Cheng Tso-Hsin (or Zheng Zuoxin, 1906-1998) who studied at the University of Michigan in the late 1920s (Grimm 1979, Boswall 1986a, Hsu 1999a, Hsu 1999b, Yang 1995). While most study was halted by war and the subsequent domestic upheaval of the Mao Zedong era (Boswall 1986a), Cheng, as the director of the ornithological division of the Peking Zoological Research Institute continued to publish papers throughout this period, culminating in his [A synopsis of the avifauna of China] (Cheng 1987), which was the first comprehensive and almost complete checklist of China’s wild birds (MacKinnon *et al.* 2000). He also founded the China Ornithological Society in 1980 and is often considered the “Father of Chinese Ornithology” (Boswall 1986a, Anonymous 2014) although other authors gave that title to David (de Carle Sowerby 1917) or Swinhoe (Collar 2004).

Much of ornithological study until the late 1970s and early 1980s was museum-based taxonomy and ‘economic ornithology’ which was, e.g., focused on protecting agricultural produce; in the early 1980s, field-based ornithology began to replace these activities, both through the universities and the Chinese Academy of Sciences (Ma Z. 2015, pers. comm.). More recent ornithological developments up to the 1990s, including the earliest developments of birdwatching and conservation, were documented in Meyer de Schauensee (1980) and Boswall (1986a, 1988, 1989). These developments also led to the publication of the first bird guides for China (Étchécopar and Hüe 1978, Étchécopar and Hüe 1983, Meyer de Schauensee 1984, Yen *et al.* 1996). For example, Qian (1995) covered most Chinese species, but its illustrations were rather bad, while other regional guides (e.g., Shi 1992, Chang *et al.* 1995) only covered parts of China. Unlike MacKinnon and Phillipps’ (2000) field guide, these previous guides had not been in Chinese, or were incompletely illustrated, and thus had limited impact (Cheung 2008, Han 2008, Guokr 2012; see also main text).

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Appendix S5. The emergence of birdwatching, and birdwatchers' interactions with civil society and government.

The emergence of birdwatching

Birds have been appreciated, used and at times even protected for millennia in China, but serious scientific study only began with Western ornithologists in the 19th century and Chinese ornithologists in the 20th century (Appendix S4).

However, birdwatching as a mass participation activity emerged only over the past three decades. Cheng Tso-Hsin stated in 1978 that “there are no bird watching organizations in the PRC,” that no colored field guide existed, and that birdwatching was not done “for pleasure” (Grimm 1979). Boswall (1988) wrote that “amateur bird-watching is non-existent” and is “yet to emerge.” Amateur birdwatchers were so rarely encountered that Zhang Zhi-yen was namechecked as “one of the very few amateur ornithologists in China” (Boswall 1986). Until the 1990s, most people saw birds as a source of food, hobby, income, or target practice (Boswall 1988). Most of the English language coverage of Chinese birdwatching since the 1990s has been restricted to publications by the Hong Kong Bird Watching Society (HKBWS). Below we summarize but also greatly expand on their reports.

The concept of birdwatching first entered China in the early 1980s, imported by Western diplomats and businessmen whose arrival accompanied major economic and political reforms (Han 2008a, Han 2008b). Other foreigners also began to come to China for the exclusive purpose of birdwatching, spreading awareness of the concept. Study China Travel was the first company to organize birdwatching tours to China in 1982, and several other American and British outfits had followed suit by 1984 (Boswall 1986, Boswall 1988). HKBWS also began to organize trips to mainland China and was able to interest locals more easily because of the shared language (Ma *et al.* 2013). As such individuals began to introduce the pastime to friends and colleagues, the first signs of a nascent interest in birdwatching among Chinese people emerged. Around the same time, the Chinese government began supporting environmental awareness campaigns, one of which was the “Love the Birds” week initiated in 1982 whose purpose was to reduce the illegal poaching of birds and which drew wide media coverage; newspapers, radio, and short movies also increasingly covered stories about birds (Boswall 1988). Consequently, the first birdwatching non-governmental organization (NGO) in China, the Kunming Bird Watching Association, was founded in 1985 to protect the black-headed gull (*Larus ridibundus*) which reformed into a birdwatching society in 1987 (HKBWS 2005, Han 2008a). In 1988, British

conservationist Martin Williams and local professor Hsu Wei-shu established the now-defunct Beidaihe Birdwatching Society (Boswall 1989) with a membership consisting almost entirely of local Chinese people, including government officials (M. Williams 2013, pers. comm.). Another pioneering NGO was the Saunders' Gull Conservation Society of Panjin City established by the local journalist Liu Detian in the early 1990s after he found out how threatened the Saunders's gull (*Saundersilarus saundersi*) is (CRIEnglish 2010).

Two major figures in the initial development of Chinese birdwatching were ornithology professors: Gao Wu of Capital Normal University and Zhao Xinru of Beijing Normal University (Li 2007b). In 1996, Gao began leading what he called “the first birdwatching activities on the Chinese mainland” with the [Friends of Nature Wild Bird Society] (Tong 2005, Lin 2006; Gao W. 2013, pers. comm.), which is one of China's oldest NGOs founded in Beijing in 1994 by the historian Liang Congjie (Ho 2001, Liu 2013). Actually, small groups already existed elsewhere in the country, but the participation of almost 100 people in these first events in Beijing heralded the dawn of mass participation birdwatching. A few participants from Beijing subsequently took part in international bird races held in the late 1990s at Beidaihe (Han 2008a, Han 2008b), and several mainland Chinese were invited to Hong Kong to participate in the Big Bird Races. Zhao, who learned of birdwatching through foreign articles related to his study, began organizing weekly lectures at his university in 1996 with the intention of nurturing China's first generation of competent amateur birdwatchers (Zhao X. 2015, pers. comm.). In several interviews, birdwatchers recounted this ‘Wednesday Class’ as crucial training for the first dedicated group of enthusiasts who would go on to popularize the pastime across China.

Birdwatching as a leisure activity thus began to gather pace in the late 1990s, helped along by growing incomes which allowed the purchase of optical equipment, as well as an increase in political tolerance, leisure time, and urbanization (Appendix S6). Another milestone was the publication of MacKinnon and Phillipps' (2000) field guide in Chinese which meant that, for the first time, Chinese birdwatchers could use a reliable and almost comprehensive identification guide. Previous guides had not been in Chinese, were incompletely illustrated and thus had limited impact (Cheung 2008b, Han 2008a, Guokr 2012). For example, Qian (1995) covered most Chinese species, but its illustrations were rather bad. By contrast, the Chinese MacKinnon and Phillipps (2000) guide was “a landmark publication” which “greatly boosted the popularity of birdwatching” (Han 2008a). It sold extremely well, due in large part to World Bank sponsorship (Cheung 2008b) which meant that its price was only 10% of the English version (T. Whitten 2012, pers. comm.). The almost universal dependence on this

field guide expressed in our interviews highlights that it was an important factor for the widespread emergence of birdwatching.

Another factor in the rapid growth of birdwatching was the consistent support of the HKBWS over the last two decades. In 1996, HKBWS invited the first team of Chinese birdwatchers to participate in their Big Bird Race, a birdwatching competition in Hong Kong. Han Lianxian was among the Chinese participants and subsequently wrote about the experience with the intention of introducing the pastime to the Chinese public (Han 2008a, Han 2008b). 1999 saw the establishment of the HKBWS China Conservation Fund which has since provided funding for several birdwatching societies' conservation projects (Crosby and Langley 2008, Lo 2008). In 2005, HKBWS set up its China Programme in conjunction with BirdLife International (BI) which has focused on supporting the development of birdwatching and encouraging conservation (Cheung 2008c, Crosby and Langley 2008). The China Programme has held training sessions throughout China to teach bird surveying, society promotion and management (Han 2008a, Fu 2011). In 2001, the bimonthly newsletter China Bird Watch began its publication to spread the idea of bird and nature conservation (Crosby and Langley 2008, Han 2008a). HKBWS also partly sponsored the publication of this newsletter which later became a magazine (China Birdwatch 2016). A major symposium was held in Chengdu in 2006 which brought together representatives from many birdwatching societies to share experiences and write a strategic plan to develop and coordinate birdwatching all over China, e.g., by setting up China Bird Net (<http://www.chinabirdnet.org/>) (Han 2008a). In 1988, the World Wide Fund for Nature (WWF) was running waterfowl census training courses at Poyang Lake, Jianqxi. These are only some examples for the many parallel activities which were pursued by different organizations, and which have continued to grow to the present day (China Birdwatch 2016).

In 2002, the Dongting Bird Race, Dongting Lake near Yueyang, Hunan Province, saw 300 contestants from around the country gather for China's first ever domestically organized birdwatching competition (Lin 2006, Han 2008a). Since then, birdwatching contests and festivals have been held in dozens of cities, and newspapers, television, and other media have frequently reported on these activities (Crosby and Langley 2008, Ma *et al.* 2013). The first Chinese Bird Photography competition was held in 2004 (Han 2008a). China Birdwatch (2016) and other online fora were established in 2005 which further stimulated the development of birdwatching. Another important online birdwatching forum was established by the WWF China program (e.g., Anonymous 2015) which most Chinese birdwatchers used between 2000 and 2010. The China Bird Report (China Ornithological Society 2014) was launched in

2002 and allowed birdwatchers to enter records in a way similar to eBird (Sullivan *et al.* 2014) which is one of the first birdwatching examples of citizen science. Thus, Chinese birdwatching had entered a period of consolidation (Lin 2006).

This rapid growth was documented by Cheng *et al.* (2013) and Ma *et al.* (2013) who estimated that the total number of birdwatchers increased from 600-750 in 2000 to more than 20 000 in 2010. Cheng *et al.* (2013) presented additional information on birdwatching societies' organized activities, legal registration status, internal management and funding sources. Many birdwatching societies also regularly held events in local schools to inform students about local conservation issues and interest them in birdwatching (Fu 2011, Cheng *et al.* 2013) which are effective tools in recruiting birdwatchers (Appendices S1.8, S2.7).

Following the HKBWS example, several birdwatching societies have been assisting others in setting up local societies (Cheung 2008a), e.g., the Chengdu Bird Watching Society provided advice to the founders of the Mianyang society (P. Li 2012, pers. comm.). Many birdwatchers have also used the internet to attract potential converts, with over 80% of birdwatching societies maintaining their own website (Ma *et al.* 2013), many with popular online fora. Now that a core group of birdwatchers with the capacity to initiate and train others has emerged, birdwatching in China has reached the critical mass which should ensure its self-perpetuating continued expansion.

While professional ornithologists in China relied mainly on specimen collection until the 1980s (Han 2008a), there has been no parallel tradition of amateur collection. While many British birdwatchers started out as egg collectors (Moss 2004), birdwatching in China was instead adopted in its most modern Western form. Chinese birdwatchers closely resemble their contemporary Western counterparts using high-tech optical and photographic equipment to identify and document birds.

The attitudes of Chinese birdwatchers also mirror those of their Western counterparts as they are also deeply concerned about issues such as habitat degradation, hunting and pollution. Moreover, the language used by Chinese birdwatchers is characterized by terms transplanted from Western discourse: terms such as [biodiversity], [environmental protection] and even [birdwatching] are ubiquitous on Chinese birdwatching society websites. However, these words are actually very recent imports which were initially derived because of the international educational backgrounds of many of China's first birdwatching and NGO leaders. These newly imported words are termed "greenspeak" referring to words that are used to raise environmental awareness. They include many recent neologisms in the Chinese language, e.g., animal rights, deforestation, desertification, ecocentrism, endangered species,

global warming, and sustainable consumption (Yang and Calhoun 2007). Indeed, most Chinese would not even understand them (Weller 2006).

Birdwatchers' interactions with civil society and government

Chinese birdwatchers have begun to show an increasing willingness to impact upon conservation and society beyond the confines of the pastime itself. Such activities have mostly focused on: (1) public education campaigns, (2) scientific research, and (3) active conservation efforts, both independently and in co-ordination with international NGOs (INGOs).

Chinese birdwatching societies' educational activities have a large audience and encompass a broad range of issues, from educating local people about a specific endangered species (Fu 2011) to the general environmental education offered by professor Zhao's 'Wednesday Class.' Birdwatchers have increasingly visited local schools and public places to galvanize support, e.g., to hold school 'bird fairs' or to celebrate "wetlands and wildness that most Chinese people regard as a waste of space or food" (Anonymous 2008). Accordingly, respondents to our second questionnaire were confident in the effectiveness of such activities to influence public awareness, and that this in turn improves the understanding of birds and environmental issues (Appendix S2.15).

Some birdwatchers have recently taken measures to ensure that the law is implemented where offences would have otherwise been overlooked, and they have begun to use the internet to spread awareness of conservation issues and to galvanize support for better legal protection of birds. For example, poachers in Xinjiang were convicted in 2012 following birdwatchers' reports (Anonymous 2012). When Tianjin birdwatchers in 2012 discovered over 40 endangered Oriental storks (*Ciconia boyciana*) which had been poisoned by baited fish, they broadcasted these news on the social media website Weibo (<http://tw.weibo.com/>); updates on rescue attempts were "re-tweeted over 900 times to more than a million users in less than an hour" (Townshend 2012). At the same locality, 60 volunteers and even the Chinese Army took down 2 km of illegal mist nets hidden in reed beds; this was reported by local and national TV and the print media (Townshend 2012). Ma *et al.* (2013) reported that birdwatchers patrolled nurseries and farmlands to inspect and remove illegal mist nets set by poachers in remote rural areas.

This response mirrored the public outcry in 2012 about a large-scale illegal trapping operation of migrant birds in Hunan (Li 2012, Townshend 2012). Widespread internet coverage led to almost 1000 volunteers in Changsha vowing to protect migrant birds (Shi 2012). The [State Forestry Administration]

subsequently announced an investigation into the incident, calling on all regions to take measures to ensure the safety of migrant birds (National Forestry Bureau of China 2012). Following these events, many articles on illegal poaching of birds began to appear across China (Townshend 2012). In both cases, birdwatchers were instrumental in discovering and reporting wildlife crimes, and canny internet use galvanized public support, triggered official action and hinted at a growing concern among the general public for the welfare of China's wildlife. Accordingly, several of our respondents stated that they had reported wildlife crimes, and many more had taken protection into their own hands by rescuing injured birds or volunteering in habitat cleanup schemes.

Birdwatchers have made many other concrete contributions to conservation through bird records, surveys and natural history information (HKBWS 2005, Ma *et al.* 2011, Guo and Ma 2012, Li *et al.* 2013, Tian and Ma 2013, CASD 2014, China Ornithological Society 2014). Since 2005, volunteers from birdwatching societies and conservation NGOs have carried out monthly bird censuses in coastal provinces which led to the establishment of the China Coastal Waterbird Census (Fowlie 2013). BI used the results and other birdwatchers' reports to write Species Action Plans, designate Important Bird Areas and support BI's habitat conservation campaigns (Zhang 2006, Crosby and Langley 2008, Chan *et al.* 2009; S. Chan 2012, pers. comm.). Organized by the China Ornithological Society, birdwatchers and researchers have worked together in recent years to regularly conduct synchronized counts of cranes, waterbirds and Oriental storks (Su and Tang 2014), and the WWF project "Monitor of shorebirds in key tidal area in the Yellow Sea ecoregion" launched in 2014 was supported by experts from the Shanghai Bird Watching Society (Lei *et al.* 2014). Since 2010, the Beijing Bird Watching Society has organized an annual survey of and workshops about the endangered rufous-backed bunting (*Emberiza jankowskii*) (Chan 2012, Fu 2013).

Birdwatchers in many areas have also become directly involved in the conservation work of INGOs, especially that of BI (Crosby and Langley 2008). For instance, birdwatchers from Fujian and Zhejiang with help from the HKBWS have monitored and guarded the critically endangered Chinese crested tern (*Sterna bernsteini*) as part of a BI project based on a Species Action Plan (Crosby and Langley 2008, Ehrenfeld 2009, Chan *et al.* 2010), and their recommendations were submitted to the relevant local and state authorities (Chen *et al.* 2009).

Birdwatching societies have also begun to take tentative steps towards directly influencing the implementation of environmental policies. About 70% of birdwatching societies submitted proposals to local governments regarding conservation of birds and their habitats, of which about 75% were fully or

partially accepted (Cheng *et al.* 2013, Ma *et al.* 2013). In 2002, an online petition collected hundreds of signatures and sent letters to about ten government agencies which successfully forced a local government in Shunyi County in suburban Beijing to abandon plans to build an entertainment center and golf course which would have destroyed a wetland bird habitat (Yang 2005, Yang and Calhoun 2007). A campaign to protect Shanghai's Jiangwan wetlands began in 2002 (Yang and Calhoun 2007), and birdwatching societies in Shanghai and Jiangsu were instrumental in gaining legal protection for sites visited by the critically endangered spoon-billed sandpiper (*Eurynorhynchus pygmeus*) (Shanghai Wild Bird Society 2011) although other important areas remain unprotected, e.g., the Rudong mudflats discovered by a team from the China Coastal Waterbird Census (Fowle 2011). A game refuge was established in Shanghai in 2007 because of a proposal by the Shanghai Birdwatching Society which led to an obvious decline in poaching (Ma *et al.* 2013). The Shenzhen Birdwatching Society kept developers away from the Futien reserve that acts as a complement to the world-famous Mai Po Nature Reserve in Hong Kong (Anonymous 2008).

Despite these tentative expansions into the public sphere, current legislation means that birdwatching societies are extremely limited in terms of growth and consolidation. All Chinese NGOs are subject to the 1998 [Regulations for the Administration and Registration of Social Organizations] which require societies to register with the [Ministry of Civil Affairs]. These regulations also prohibit NGOs from establishing branches in other provinces and allow only one society per 'issue' to register in the same area (State Administration for Industry & Commerce of the People's Republic of China 1998). Only registered societies are able to open bank accounts or raise funds publicly (Hildebrandt 2011). Registration itself is a complex and expensive process, requiring a base capital of at least 30 000 RMB for a regional NGO along with official sponsorship from a government agency (Schwartz 2004, Alpermann 2010). Societies regarded difficulties with registration as the third biggest obstacle to their development, after funding and staff problems (Schwartz 2004, Cheng *et al.* 2013, Ma *et al.* 2013). Consequently, only 23 of China's 37 birdwatching societies were registered in 2012 (Cheng *et al.* 2013), and some simply registered under the head of their provincial wildlife conservation associations to avoid the red tape (Han 2008a).

Moreover, a registered NGO is far from immune to governmental interference; e.g., registered NGOs in Yunnan were threatened with forced disbandment following protests against dam building (Hildebrandt 2011). INGOs have been similarly restrained by complex regulations which often mean they are restricted to capacity-building projects and working with comparatively inexperienced domestic

societies. Government control of environmental NGOs (ENGOs) remains extensive and is a considerable constraint on their activities (Tong 2005, Stalley and Yang 2006). The requirement of registration exists not to stifle environmentalism *per se*, but to “manage and control the rise of social organizations” (Hildebrandt 2011) which, if left unchecked, could conceivably challenge governmental autocracy.

Despite these restrictions, the Chinese government is not anti-conservation *per se*, as China has experienced a gradual “greening” since the 1990s (Ho 2001, Harris 2004, Economy 2010, Cook and Murray 2013). Environmental protection laws date back to 1979 (Alpermann 2010), and the central government has since become more serious about combating environmental degradation, with dozens of new laws and regulations and several hundred documents implemented to better protect the environment, as well as financial investments of billions of dollars which established, among others, “a vast network of environmental protection agencies at the national, provincial, municipal, and county levels of government” (Wong 2003). Thus, China today boasts “very strict and comprehensive environmental protection legislation” (Alpermann 2010). Consequently, government-organized initiatives had some successes, e.g., efforts to save the endangered crested ibis (*Nipponia nippon*) (Xu and Giles 1995, BirdLife International 2014). However, implementation and enforcement remain limited, weak and haphazard (Stalley and Yang 2006, Li 2007a, Liu and Diamond 2008). While so far a largely one-way, top-down process with major implementation problems, legal protection of China’s wildlife is part of the central government’s general policy. Birdwatching societies’ current activities are therefore in line with governmental policy, seeking as yet only to combat illegal activities such as poaching rather than, e.g., major government-sponsored infrastructure projects.

The aforementioned contributions of birdwatchers to policy implementation may represent the germs of an emerging discourse between government and civil society. Some researchers (e.g., Ma *et al.* 2013) have interpreted this as a significant development. However, any present discourse is inchoate, due to reservations on both sides (Economy 2010, Wells-Dang 2012, Cook and Murray 2013). Despite their evident passion for conservation, birdwatchers are demonstrably reluctant to appear politicized, and their attempts to influence policy implementation usually remain strictly within the confines of government-approved behavior. Accordingly, respondents to our questionnaires were not very confident that “birdwatching societies and birdwatchers themselves can influence the implementation of law.” The first author was advised by several respondents to remove the statement “birdwatchers have the ability to influence policy” from initial drafts of the questionnaires. Having witnessed the consequences of overly

combative NGO actions, birdwatchers are very aware that substantial opposition to government rule will not be tolerated. Consequently, emphasis is placed instead on education and implementation of existing legislation because birdwatchers are essentially powerless to effect legislative change.

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* = this link used to be active, but was not active anymore in June 2018.

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Appendix S6. Socio-economic and political enabling conditions for the emergence of birdwatching. In this appendix, we argue that, besides the factors mentioned in the main text, four socio-economic and political developments were also crucial for the recent emergence of birdwatching.

Political tolerance

One enabling condition may be especially pertinent in China's case. In the 1960s, every aspect of Chinese life was highly politicized, and followers of many pastimes had no choice but to give them up or face accusations of indulging in 'bourgeois' frivolities. By the 1980s, however, post-reform official attitudes had shifted: "People were now allowed to spend their time however they pleased so long as those activities posed no threat to the existing social order" (Wang 1995). The combination of political tolerance and sufficient leisure time (see below) allowed recognizable pastimes to emerge, e.g., fishing and stamp collecting (Wang 1995). The political freedom to pursue one's interests without negative ramifications was thus an important pre-condition for the emergence of birdwatching.

Leisure time

Birdwatchers also need sufficient free time. At around 46 hours, the average Chinese working week remains one of world's longest (Misra and Smyth 2013). However, recent decades have seen a considerable increase in leisure time. State regulations have repeatedly shortened the official working week, from 48 hours in 1949 to 40 in 1995 (Ministry of Labour and Social Security PRC 1994); while often flouted by private businesses, this is usually adhered to in the state sector (Cooke 2005). Unpaid labor and obligatory political exercises meant that, during the Mao era, actual free time often amounted to far less than legislation would suggest. The end of such practices, the aforementioned changes in the law and a boom in time-saving household appliances meant that, for the average worker, the amount of free time increased hugely between the 1970s and 1990s, more than doubling between 1980 and 1991 to an average of 4.5 hours per day (Wang 1995). Even more significant for birdwatching specifically was the introduction in 1995 of a standard two-day weekend which led to a surge in domestic travel, as most people could now spend whole days away from home (Hutzler 1995). Respondents to our questionnaires agreed that people have now more leisure time than 20 years ago, and that birdwatching is therefore becoming more popular (Appendix S2.15). Furthermore, working hours in China are negatively correlated to income (Misra and Smyth 2013). Since birdwatchers tend to have above-average incomes (see below), they also tend to have more free time.

Affordability of optical equipment

Birdwatchers also need optical equipment. While used mainly for professional purposes until the early 1980s, sales of binoculars increased fourfold between 1979 and 1989 as prices fell considerably while incomes increased dramatically (Feng 1991). The first Chinese-produced binoculars appearing in the 1990s made them even more affordable. Sales of cameras also rocketed during the 1980s (China Camera Net 2010); by 2009, 63.5% of Beijing residents owned a digital camera (Hakuhodo 2010). Birdwatching society websites and fora reveal that posting photographs is an important way in which enthusiasts share their enjoyment (Appendices S1.9, S2.10). A key motivation for some and at least an enhancement for most, the spread of affordable photographic equipment thus spurred on the emergence of birdwatching.

Urbanization

This emergence also coincided with a massive growth in the urban population, which increased from 36.1% in 2000 (National Bureau of Statistics of China 2001) to > 50% in 2011 (National Bureau of Statistics of China 2012), due mostly to rural-urban migration. This rapid urbanization has functioned both as a further enabling condition for the development of birdwatching and as a fundamental societal transformation which triggered a widespread shift in urban Chinese recreational habits and underlying conceptions of nature.

Urban concentrations allow people with similar interests to more easily form associations. The widespread emergence of formal societies during the 1980s was overwhelmingly concentrated in urban areas (Whyte 1992), and all birdwatching societies in China today are based in major population centers (Cheung 2008, Han 2008; see also below). While physical distance may be less of an obstacle to association in the digital age, the urban concentration of population has nevertheless facilitated further contact between those with similar interests.

A second effect of urbanization is the separation of people from natural environments, generating in many a sense of detachment and a corresponding desire for reconnaissance with the natural world. Many studies of 20th century Western recreational habits identified a relationship between increased urbanization and a growing conception of nature as a healthy and desirable focus for recreation (Allen 1976, Barrow 1998). Similar changes are underway in China, e.g., a general increase in travel to rural beauty spots (Weller 2006) or efforts to reconnect urban children with nature (Liu 2013, Zhang *et al.* 2014). One of the main rationales of the Friends of Nature Wild Bird Society's founding was to establish links between the urban public and nature through gardening and birdwatching societies (Liu 2013).

Some answers to our questionnaires and interviews, e.g., the desire to appreciate the countryside, point to similar motivations of reconnaissance in birdwatchers.

Furthermore, urbanization may have a considerable influence upon underlying societal conceptions of nature. Several social historians posited changing attitudes towards wildlife as characteristic of post-industrial urbanized societies (Kellert 1985, Hou 1997). Our research suggests that the attitudes of Chinese birdwatchers correspond to such attitudes, as our respondents mentioned the appreciation of the birds' beauty and the need to understand birds and their ecology (Appendices S1.9, S2.10). Such motivations are clearly consistent with what Kellert (1985) termed 'aesthetic' and 'ecologicistic' attitudes. It seems likely that these non-utilitarian attitudes towards wildlife which motivate Chinese birdwatchers are at least partly the product of a society in which the demands of urban lifestyles arouse a desire to reconnect with nature, and in which urbanization ensures that daily contact with animals is sufficiently low for wildlife to be viewed as an appealing recreational focus.

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Appendix S7. Brief review of the attitudes of the Chinese public about the state of the environment and possible long-term sustainable solutions.

Conservation efforts in China may be helped along in future decades because the concerns of birdwatchers over the dismal and disintegrating state of the environment and the government's lax attitude (see main text) are mirrored by growing concerns among most Chinese citizens, so much so that 59% (Xi *et al.* 1998), 35% (Wong 2003) and 57% (Yu and Pugliese 2012) of respondents prioritized the protection of the environment over economic growth, and 68% agreed to higher energy costs to prevent global climate change (Tuck and Watsa 2010). However, Chinese people still remain among the least concerned about climate change in a recent international study (Stokes *et al.* 2015), with concern actually decreasing during the last five years; nevertheless, a majority of Chinese continue to support an international climate change agreement. In several surveys summarized in Xi *et al.* (1998), more than 90% of respondents were concerned about environmental issues, an average of 62% considered environmental pollution to be serious or very serious, and between 60% to 90% believed that environmental damage harms human health (even up to 95% in two surveys cited by Brettell 2003). Among university students, environmental awareness was also very high, although they also strongly believed that further economic growth and government action will solve many environmental problems (Inglehart 1997, Stalley and Yang 2006; see also Wong and Chan 1996) and thus still prioritized the economy over the environment, although environmental concerns were given the second highest priority (Wong 2003). University students also believed that, under the present regime, "they have little power to revoke the government's environmental policies, and thus count on [the government] to protect the environment" (Wong 2003). Both university students and the general public were most concerned about deforestation, air and water pollution (Wong 2003). Among local government officials and enterprise managers in six Chinese cities, 64% agreed to close polluting enterprises, especially if they made only average profits (Tong 2007).

Such concerns are not evenly distributed across Chinese society; overall, females, urban residents, and younger, richer and more educated people had a higher awareness and more serious concerns about the environment's state (Xi *et al.* 1998, Harris 2004, Weller 2006, Cao *et al.* 2009, Shields and Zeng 2012, Chen *et al.* 2013). Urban, younger and more educated people thus make up both the highest proportion of birdwatchers and the section of society most concerned about the state of the environment.

Once people appreciate nature, they also usually become concerned about its deteriorating state and frustrated and even angry about the lack of environmental action.

There is also a growing recognition of the economic costs of environmental degradation, resource scarcities, pollution and the loss of ecosystem services (Harris 2004, Harris 2006, Liu and Diamond 2008, Xie *et al.* 2012, Cook and Murray 2013, Grumbine and Xu 2013, Xie *et al.* 2015) which was estimated to be about 12% of China's gross national product (Economy 2010). This growing awareness led, e.g., to logging bans and natural forest conservation after catastrophic floods (Liu and Diamond 2008) and even caused some long-lasting and at times violent protests (Ho 2001, Brettell 2003, Tong 2005, Stalley and Yang 2006). Environmental issues are now the number one cause of public protests in China (Levitt 2015). While birdwatchers are usually not part of such violent confrontations, they are nevertheless part and parcel of the growing awareness and concern about environmental issues (Harris 2004) and the desire to find long-term sustainable solutions which combine economic gain with environmental protection and restoration (e.g., Liu and Diamond 2008, Liu and Raven 2010, Grumbine and Xu 2011, Zheng and Wang 2014).

The problem remains, however, that "environmental attitude is not a good predictor of environmental behaviour" (Lo and Leung 2000), especially in China where citizens are discouraged to directly criticize the government or organize in any way (e.g., into government independent NGOs), are only allowed very few avenues for complaining about environmental problems and are often unaware what these avenues actually are, and therefore usually consider the government responsible for taking environmental action (see above and main text).

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