The seminal legacy of the Southern African Bird Atlas Project

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THE FIRST SOUTHERN AFRICAN BIRD ATLAS Project was launched in 1986 and gathered bird distribution data from six countries of southern Africa. The project culminated with the publication of *The Atlas of Southern African Birds* in 1997. The database generated by the project, seven million bird distribution records, has been widely used by four groups: environmental consultants (for example, to locate electricity transmission lines), conservationists (planning conservation strategies), research scientists (especially macro-ecologists and biogeographers) and birders (ecotourism materials). By 2007, the database had spawned 50 research publications and eight Ph.D.s and master's degrees. These products are a tribute to the more than 5000 'citizen scientists', who gathered the bulk of the data. The atlas concept has been extended to frogs, reptiles, spiders and butterflies; a second bird atlas started in 2007 and will, for example, facilitate knowledge of the impact of environmental change on birds. The South African National Biodiversity Institute is playing a lead role in initiating these new projects.

Twenty-one years have passed since the Southern African Bird Atlas Project (SABAP) was launched in 1986, Africa's biggest public-participation biodiversity database. In July 2007, South Africa launched a follow-up project: SABAP2. It is opportune, therefore, to evaluate the legacy of SABAP1 and ask whether all the excitement and enthusiasm generated by the first project, as well as its cost, was justified. This article complements two global reviews of bird atlases, which respectively considered methodological developments, based on 411 bird atlases,[1] and the applicatioins to which bird atlas data had been put, based on 272 bird atlases.[2]

SABAP ran its course from 1986 to 1997, and gathered data across the region on distribution and abundance of 932 bird species in the region.[3,4] This was accomplished mainly by mobilizing an amateur army of more than five thousand birdwatchers. These 'citizen scientists' have made a major contribution to bird atlas projects globally.[5] It was a lengthy endeavour, but then it did cover six southern African countries (Botswana, Lesotho, Namibia, South Africa, Swaziland, and Zimbabwe) and it was the first time a biological survey had been attempted on anything like that scale in Africa. Indeed, SABAP remains one of the largest completed projects of its kind, even globally.

SABAP delivered two material products: a database of seven million peer-reviewed distribution records, and a two-volume, 1500-page publication which presented the results of the project, and much more besides.[4] As with all scientific information, the value of these products can be assessed only in terms of the use to which they have been put and the degree to which they have exerted an influence on further scientific endeavour and societal awareness of scientific issues. This essay reflects on that use, as well as the impact that SABAP has had on scientific activity in the region.

The bird atlas publication

In principle it should be easy to obtain a measure of the use to which a publication has been put by consulting citation indices. However, the bird atlas is a multi-authored work (62 authors and seven editors) and it explicitly recommended citation by chapter. Most citations therefore refer to specific chapters and species accounts by the names of their specific authors, making a comprehensive measure of citation frequency practically impossible. It would be true to say, however, that most papers dealing with the ecology or distribution of a species of bird in southern Africa has, since 1997, cited *The Atlas of Southern African Birds*.[4] For example, 170 full-length papers (on any topic) were published in the journal *Ostrich* between 1999 and March 2006. Of these, 60 cited the *Atlas*, making it the most cited reference in the journal over this period, with the sixth edition of *Roberts' Birds of Southern Africa*[6] in second place with 44 citations. The seventh edition of *Roberts'*[7] – a comprehensive handbook in which the *Atlas* distribution maps are recycled – has about 900 references to the *Atlas*,[8] more than to any other publication, confirming the status of the *Atlas* as a standard reference.

It is worth noting that the *Atlas* did not provide information on distribution alone. It presented important new information and analyses on the seasonality of breeding, and the direction and seasonality of migration. The *Atlas* has therefore proved an essential reference for all research involving these fundamental aspects of avian biology.

The SABAP database

The SABAP database has been used in various ways for a variety of purposes. Four main user constituencies can be identified: environmental consultants, conservationists, research scientists and birders. Environmental consultants form by far the largest group in terms of number of requests for data. More than 200 requests for data from this group have been serviced by the Animal Demography Unit (ADU) in the past 10 years. The most frequent user has been the national electricity supplier Eskom; this utility company uses data on the distribution of certain key species in planning mitigation measures for its power transmission lines. Data needed by environmental consultants are typically lists of species, and their relative abundance, for specific grid cells.

As groups, conservationists and research scientists overlap to some degree, so it is perhaps more instructive to speak in terms of the type of use. The uses can be summarized as conservation planning, ecological/biogeographical studies, and single-species ecological studies. The last-mentioned data need is largely met by the atlas publication,[4] so the number of requests for more detailed information on single species has been relatively small.

On the other hand, macro-ecology and conservation planning typically involve analyses of data sets spanning many or all species in a group. Almost all the South African provincial nature conservation agencies and three national institutions in the five other participating countries have acquired or further developed the bird atlas data sets for their specific use in internal research and conservation planning. For example, the Namibian Avifaunal Database, a multifaceted biodiversity database built around the country's atlas contributions to SABAP, is one of Namibia's strongest biodiversity information systems (www.met.gov.na/programmes/biodiversity/infosys.htm).

In South Africa, in addition to provincial analyses, there have been national analyses, the most important of which is probably the South African National Spatial

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Biodiversity Assessment (NSBA), an initiative commissioned by the national Department of Environmental Affairs and Tourism.[9,10] The NSBA provides a broad framework for the prioritization of conservation effort in the country. This major analysis used seven South African biodiversity databases of 14 originally considered for use in the terrestrial component of the analysis.[10] Of the seven eventually chosen, because they were sufficiently comprehensive, one was the SABAP database. Another was the frog atlas database, which we discuss below.

Two publications of direct importance to the national and regional conservation of birds are *The Important Bird Areas of Southern Africa*[11] and the *Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland*.[12] Both of these analyses drew heavily on information in the SABAP database.

Among macro-ecologists, local and international interest in the SABAP database has led to an impressive list of publications which acknowledge SABAP as a source of essential data. These include papers on the impact of specific local environmental trends on birds,[13–15] theoretical approaches to reserve selection,[16–21] and analyses of macro-ecological and biogeographical phenomena and concepts.[22–32] (For a list, currently of 50 publications using the SABAP database, see the ADU website at www.adu.org.za.) In particular, the use of bird atlas data combined with focused field surveys of threatened or endemic species has allowed the estimation of population sizes, strengthening the link between atlasing and red-listing processes in biodiversity conservation.[22]

By 2006, eight postgraduate students had completed theses based on analyses of the SABAP database.[32–39] These students were at five universities (three in South Africa and two in the U.K.), and explored the database from a variety of disciplines and perspectives, further emphasizing its richness.

Birders and landowners have occasionally accessed bird atlas data to use as a guide to birding in specific areas, and for the development of eco-tourism materials. These uses were, however, discouraged to some extent by the initial application of data-extraction fees. We expect that these types of use will increase now that the bird atlas data are increasingly available online, free of charge at www.birds.sanbi.org and www.adu.org.za

Public awareness and participation

The impact of SABAP on public awareness of birds and their attendant conservation issues has not been measured across society, nor would it be easy to do so. Nevertheless, there is unanimity within birding, ornithology and conservation circles that SABAP had an enormous influence on birders and others in South Africa and beyond. There were more than 5000 direct contributors to SABAP. In addition to these, many citizens were aware of the project, especially rural landowners, who frequently allowed atlasers to explore their properties. This awareness on the part of landowners alone probably had a salutary effect on their sense of their role as stewards of the region's biodiversity.

Many birders testify that atlasing became, for them, a more rewarding form of their hobby because it had a clear and a larger purpose. Both the concept and the activities of the atlas helped them to see birds and their hobby in the context of broader ecological issues. The need to identify species positively so that one could record as many as possible in grid cells – the sampling units of the atlas – became a strong incentive to hone identification skills. The imperative to record comprehensive lists of species encouraged a greater awareness of species' preferred habitats because it would be in those habitats that the species were likely to be observed and 'ticked'.

Since SABAP, there has been a quantum leap in skill and professionalism among the rank and file of amateur birders, making them an even more valuable human resource for data collection than they were before. This bodes well for SABAP2.

Perhaps the greatest positive influence of the atlas on the birding community was its demonstration that even amateur birders – as opposed to specialist bird ringers and ornithologists – could make a significant contribution to science, indeed, that they could become 'citizen scientists'. Not only did the simple yet scientific methods of SABAP give many birders a first introduction to how science works, but the scientific output from the project showed how small contributions could be amalgamated into a meaningful and impressive whole. This new perception of their role as citizen scientists helped many birders make the transition from the relatively straightforward activity of atlasing to the more challenging requirements of bird monitoring projects. It was this pool of available skill and enthusiasm that the Animal Demography Unit and BirdLife South Africa tapped into by launching, in chronological order, Coordinated Waterbird Counts (CWAC), the Birds in Reserves Project (BIRP), and Coordinated Avifaunal Roadcounts (CAR).[40] These three projects are ongoing and have each accumulated more that 10 years of invaluable biodiversity monitoring data.

Further atlases and a new era

Beyond bird-related projects, the success of SABAP provided encouragement to other specialists that comparable projects could be successfully organized for their taxon groups, and that they could bring to their disciplines the benefits of such a broad-scope survey. The Protea Atlas Project (1991–2001) was the first to be launched, followed by the Southern African Frog Atlas Project (SAFAP; 1995–2004)[41] and, more recently, the Southern African Reptile Conservation Assessment (SARCA; 2005–09) and South African National Survey of Arachnida (SANSA; 1997–). An atlas project on butterflies, the Southern African Butterfly Conservation Assessment (SABCA; 2007–10), was launched in 2007.

All of these projects are closely linked to the recent transformation of South Africa's National Botanical Institute (NBI) into the South African National Biodiversity Institute (SANBI).[42] Through partnerships between the Animal Demography Unit and other specialist institutions with SANBI, these atlases will contribute essential biodiversity information to help SANBI monitor and report to government on the state of biodiversity in the country. SANBI is the lead organization implementing the National Environmental Management: Biodiversity Act (NEMBA), as well as supporting government in implementing the Convention on Biological Diversity (CBD). To do this most quickly, SANBI has prioritized the online publication of essential biodiversity data, such as atlas information, to support planning, policy-making, decision making and research by a variety of users. These activities include sound spatial development planning, state-of-the-environment reporting, and conservation planning based on the prediction and detection of responses by species and ecosystems to environmental change.

Collectively, the atlas projects represent a new era in biodiversity field research in the region.

A new bird atlas project, SABAP2, was launched in 2007. While predictions are risky, we venture to predict that SABAP2 will eclipse SABAP1 in terms of scientific impact. SABAP2 will be the first time in Africa that a survey of this magnitude has

been repeated, and in principle presents a unique opportunity to compare major biodiversity data sets as 'snapshots' of different time periods. Given the intense interest in global environmental change and the impacts of human society on ecosystems and biodiversity, the results of SABAP1 and SABAP2 are guaranteed to be thoroughly explored. The challenge of achieving comparability between the two, while moving to finer-scale spatial resolution in SABAP2, is not trivial, but we are confident that it will be amply worth the effort and cost. We expect SABAP2 to help reveal and document trends in bird populations and to suggest a slew of new hypotheses on their causes. If we be condemned to live through 'interesting times', let us at least extract all the scientific value from them that we can!

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