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BOOK REVIEW

McDiarmid, R.W., Foster, M.S., Guyer, C., Gibbons, J.W. & Chernoff, N. (2012) Reptile Biodiversity: Standard Methods for Inventory and Monitoring. University of California Press, 412 pp. ISBN: 978-0-520-26671-1.

Effective and targeted conservation action often requires detailed information about species, their distribution, systematics and ecology. With nearly one in five species being globally threatened with extinction, and another one in five species classed as Data Deficient, reptiles are among the least studied groups of vertebrates. The situation is critical in the South Asian region, where despite a recent surge in taxonomic work, ecological knowledge of reptiles remains surprisingly meagre. This is partly due logistic difficulties in studying reptiles, but also to a lack of clear methodological guidelines for field sampling. Assessing the diversity, abundance and behaviour of reptiles presents a unique set of challenges and sampling considerations. Most species are highly cryptic and have very limited activity periods; some inhabit microhabitats that are difficult to access; some species are too large and/ or dangerous to handle; some are quite long-lived making it difficult to study a significant proportion of any individual's lifetime, and as a group they inhabit a wide array of habitats making any single system of sampling impossible. Hence, until recently, methods of studying this highly varied group of taxa were limited to methodologies scattered in specialised journals, text books, procedural notes and grey literature.

Reptile Biodiversity: Standard Methods for Inventory and Monitoring, the fourth in a series of books dealing with standard methods for studying the biodiversity of different taxa, is among the most comprehensive books on methods yet published, regardless of taxa. This single volume is an authoritative addition to the field of herpetology, and expands the scope and detail of earlier resources. The publication is enhanced by its editorial personnel and by a multitude (70) of contributing authors, most internationally acclaimed, with extensive experience and expertise in their respective domains. This volume adheres to the view that sampling is meticulous science, and aims to set forth standardised methods for conducting reptile research, thus bringing legitimacy to data regardless of the collector. The contents are targeted at professional scientists, research students, government personnel, conservationists, managers, decision makers and amateur herpetologists alike.

The book comprises 17 chapters divided into four parts. The volume opens with the *Introduction* comprising two chapters. One chapter discusses the historical roots of reptilian biodiversity assessment and emphasizes the need for detailed and standardised studies on reptiles. The other provides a succinct overview of the natural history of reptiles, along with a taxonomic review of extant groups. Species assemblages are categorised into regions: Africa, Americas, Asia, Australia and Europe.

With an emphasis on precision and logic, the second part, *Planning a Diversity Study* (Chapters 3-10), discuss the theoretical aspects of reptilian studies, while laying the groundwork for designing studies. It is the core of this volume and explains the rationale and justification for the methods. Chapters and sections deal with a number of pre-survey considerations, including the type of surveys needed (inventory *Vs* monitoring, quantitative *Vs* qualitative), underlying principles in data collection, storage and graphical representation. Topics include dealing with methodological errors in field work and analysis, dealing with associated data (e.g. climatic data), automated data acquisition (e.g. dataloggers), utility of handheld computers for digital data collection and data quality assurance. The section on map and atlas production highlights the emerging trends in cutting-edge GIS technologies while still discussing the more traditional approaches. The chapter on finding and capturing reptiles (Chapter 5) is a succinct summary of methods for detecting, counting and sampling different groups of reptiles. In addition to the technical aspects, the text also highlights the importance of collaborating with the locals during field work, a step applicable for all field work regardless of the study group. The two subsequent chapters treat the necessity of collecting and preparing voucher specimens (including euthanasia, fixatives, tagging), a critical aspect of taxonomic studies, and those that require validating the occurrence of target taxon. Ethical considerations in working with reptiles, safety precautions in handling animals, standard marking techniques and methods to determine the age, sex and reproductive condition of reptiles are dealt with here. Some chapters have additional 'boxes' highlighting important topics (e.g. relational databases, metadata, hemipenis preparation). Collectively, this part provides a theory-based step by step approach for developing an effective sampling strategy.

Sampling Reptile Diversity is the third part and its six chapters (11-16) are devoted to discussing practical 'on-ground' methods for a wide array of topics including techniques for difficult-to-sample habitats,

parametric analysis of data and monitoring exploited species. The coverage is extensive, with detailed information on constructing sampling and trapping regimes for different habitats (including habitats such as the forest canopy, mangroves etc.), use of telemetry for tracking and locating individuals, mark and recapture studies and a variety of other more specialised sampling techniques. For certain sampling devices the authors provide a veritable shopping list of required materials. A series of boxes provide specific concerns for sampling in particular ecosystems. Black and white photographs and figures lavishly illustrate how sampling technology is constructed and deployed. Three chapters address mathematical and statistical concepts: the statistical properties of the techniques and validation (12), parametric analysis of data (14) and population sizes and demographics (15). The part closes discussing the challenges of studying and monitoring exploited species and the conservation implications of such work. This part contains several useful tools to initiate new research.

The final part of the volume looks at the future of reptilian biodiversity surveys, both in a scientific and a conservation perspective. Appendices present information on significant museum collections of reptiles and websites of interest for materials, supplies and software vendors. The 41 pages of citations (in small font, double columns and current to late 2010) will be a valuable resource to many readers, as it compiles literature that was widely scattered.

This mammoth project is a veritable 'How-to' manual for conducting reptilian field studies but most sections arguably could be applied to other taxa. As in any other book of this nature, some little known techniques as well as some well-known important references are likely to have been missed as no single volume can cover the entire scope of reptile field and analytical techniques. Certain sections are also likely to be outdated soon, as technology is a field in constant flux. Some appendices would have a limited shelf life but can serve as an invaluable starting point for information on these resources. As each topic is discussed by different investigators, the level of information, tone and format is not consistent in some sections, but the overall presentation is clear. Since most authors have brought in their own experiences, a majority of the text have a North American or an Australian emphasis (the areas where research historically has been focused), but the contents are applicable globally and have vast relevance and significance to studies in South Asia. Because of the diversity of topics and information in this volume, it could also be difficult to quickly locate a specific section of interest by using the index alone, as some of the key topics are not listed in the indices.

Overall, the volume give an expansive view of the art and science of sampling reptiles, which is no small accomplishment considering the breadth of material covered. It is an informative, thoughtful accumulation of field and related laboratory protocols and creates a solid foundation on which new field research on reptiles can be built. The authors and editors have done an admirable job by setting a high standard for field manuals. This volume will stimulate an increase in the use of soundly-based methods for reptile ecological field research, leading to the development of sound conservation policies.

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