SARA E. VERO

FIELDWORK READY

AN INTRODUCTORY GUIDE TO FIELD RESEARCH FOR AGRICULTURE, ENVIRONMENT, AND SOIL SCIENTISTS

American Society of Agronomy | Crop Science Society of America | Soil Science Society of America

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With gratitude to all those friends who have dug through the earth, marched across grasslands or waded upstream with me. What a wonderful adventure.

To the reader; my grandfather Paddy Vero said that "An ounce of help is worth a ton of pity." I have been the happy beneficiary of many kind helpers. I hope this book will give you at least that ounce of help when you need it.

"Whatsoever your hand finds to do, do it with all your might"

Ecclesiastes 9.10

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Preface

Field-based research is a cornerstone of agronomic and environmental science, yielding information that helps us produce crops efficiently, manage resources, and steward the environment. For students and researchers, it allows insights into the real world, which cannot be achieved in the classroom or library alone. Fieldwork is, for many, an exciting and engaging part of their work and studies. However, it brings unique challenges pertaining to experimental design, planning, safety, and team management, in addition to the scientific techniques being employed. The field researcher needs to be well-rounded and adaptable; able to deal with the unexpected and to improvise in response to challenges arising outside of the clean, controlled environment of the laboratory.

Fieldwork Ready is intended to help you to become an effective researcher, whether you are involved in agronomy, soil science, hydrology, geography, or any other field-based study. This book includes advice on design, planning, and logistics, which are essential for all field researchers, and then discusses basic techniques related to environmental monitoring, and soil, water, plant, and wildlife research that any investigator should be familiar with. These are intended as a guide upon which you can and should build further skills. For those of you who are already experienced in the field, this book should help you think more deeply about how and why you do field research, and hopefully, to improve upon your skills and knowledge.

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1
Introduction

This manual provides simple guidance to help you perform safe and successful fieldwork as part of your research. The “field” can be urban, rural, or wild. You may work alone or in a team. The experiment may be structured or survey-based in design. You may operate adjacent to your research center or in remote locations. Regardless, there are principles and considerations that can be universally applied that will allow you to implement a robust and meaningful research project and collect quality data. While this manual can help anyone involved in outdoor research, it is particularly aimed toward graduate and undergraduate students, and early-career researchers who are honing their skills and gaining experience. Everyone makes mistakes in their early development, and fieldwork often involves a steep learning curve, potentially hazardous or challenging conditions, and considerable time and financial commitments. Naturally, your unique field of study will determine some of the technical skills that you will build and depend on, but elements of planning, site description, logistics, and teamwork are universal. Experience is the best teacher, but hopefully this manual will help you to make a good start.

What is “Fieldwork?”

Fieldwork is any research or data gathering conducted outdoors, outside of the laboratory, library, or office settings. As researchers, our individual fields can be almost anywhere (Figs. 1.1 and 1.2). For a sociologist, it might be a school, a shopping mall, or wherever there are people.

For a marine biologist, it may be on or even deep within the ocean. This particular guide is generally intended for students and researchers in the broad disciplines of soil, crop, and environmental sciences. However, many of the principles discussed throughout this book will be helpful for any researcher venturing outside of the laboratory setting.

For simplicity, I will refer to all outdoor research as “fieldwork” and all indoor research (be it laboratory, desk, or workshop) as “labwork.”

The challenge faced by researchers in the field is to apply scientific methodologies into environments which are by their very nature, heterogeneous and subject to limited human control. As field researchers, we cannot control the weather, the movements of wildlife, heterogeneity of soils, rock, or vegetation, and innumerable other factors which may influence the results of our investigations. This may seem contrary to the scientific method, which typically controls variables and factors so that one or a few factors of particular interest may be examined independently. In reality, outside of the laboratory, these conditions rarely, if ever, exist (Fig. 1.3). Fieldwork is therefore critical to examine how the theories, devices, and processes developed under controlled conditions perform in reality.

Fig. 1.1 Researchers investigating a soil pit in Ireland.

Source: Sara Vero.

Fig. 1.2 Field research can take you to some breathtaking scenery.

Source: Bo Collins.

Research can be considered to take place within a "hierarchy of complexity" (Read, 2003). Studies that are reductionist in approach, dealing with only one of the many variables which simultaneously influence biological, physical, and chemical functioning in reality, can provide insight into the underlying mechanisms of behavior. However, these effects might be difficult to discern or become less influential at the field scale. These studies offer a high level of "precision," but perhaps, a lower level of "relevance." Conversely, field studies allow a broader understanding of patterns and effects within a "real-world" context. In other words, they have a lower level of "precision," but a high level of "relevance" (Read, 2003). Of course, there is no strict rule regarding this; rather, it is a spectrum along which various experimental approaches are positioned. For this reason, coupled field and lab studies can be used to develop a more integrated understanding. This is common, especially when developing a thesis at graduate level. Let us take an example. A student investigating potassium (K) requirements of mixed species grassland might conduct three structured experiments.