Chapter 8
Social Context of Citizen Science Projects

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ABSTRACT
This chapter provides a brief history of citizen science in our societies, identifies the main stakeholders involved in projects of this topic, and analyzes the main points to take into consideration, from a social perspective, when designing a citizen-science project: communicating; recruiting and motivating participants; fostering innovation, interdisciplinarity and group dynamics; promoting cultural changes, healthy habits, inclusion, awareness and education; and guiding policy goals and decisions. Different governance structures, and a coexistence of different approaches, are analyzed together with how they suit different communities and scientific studies.

INTRODUCTION
Citizen science engages the general public with scientific research activities, and while not new, is becoming a mainstream approach to collect data on a variety of scientific disciplines (Miller-Rushing, Primack, & Bonney, 2012). The consolidation of citizen science can be perceived from the adoption of a formal name, increased research about the field and formalization of international associations. Citizen science maturity has advanced with technology innovations of recent years.

Societies are facing rapid changes in values, interests and expectations. The growth of social networks and collaborative web projects has implications for the relations between scientists, decision makers and different societal groups. Citizen science is growing to be a mechanism that allows citizens to have an active role in science development and in dealing with important environmental and scientific questions.

Scientists who support the rise in citizen science recognize the benefit of volunteer contribution to science in terms of increased scale, data collection and analysis, outreach capacity, while dealing with budget constraints. Consequently, an increasing number of studies have started to work with volunteer citizens, helped by easily accessible technological tools. Awareness among scientists for these social
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changes has increased, generally in a gradual way, but faster in countries with a higher tradition of public participation, especially scientific participation (Hess, 2010).

Citizen science can also have a positive impact on society and support sustainable development, by fostering connections between environment, society and economy and overcoming barriers between disciplines (Giddings, Hopwood, & O’Brien, 2002).

Given its collaborative nature, citizen science is characterized by a wide range of stakeholders, whose motivations and interactions can be determinant for the success of a citizen science project and thus should be carefully taken into account on project design.

This chapter provides a brief history of citizen science and identifies the main stakeholders involved in these projects. The chapter then analyzes the main points to take into consideration, from the perspectives of these different stakeholders, when designing a citizen science project.

THE HISTORY OF CITIZEN SCIENCE IN OUR SOCIETIES

For centuries, scientific research was conducted by amateurs (people that were not paid to do science) (Vetter, 2011). Professionalization of science, in the late 19th century, drew those amateurs away from the scientific world and created a big gap between “real scientists” (people that are paid to do science) and citizens interested in those subjects (Vetter, 2011).

John Ray, Alfred Russell Wallace, Gregor Mendel are prime examples of amateurs who produced incredible scientific advances. John Ray published important works on botany, zoology, and natural theology and his classification of plants in *Historia Plantarum*, was an important step towards modern taxonomy (Raven, 1942). Alfred Russel Wallace was a British naturalist, explorer, geographer, anthropologist, and biologist. His best known work was on the theory of evolution through natural selection and his paper on the subject was jointly published with some of Charles Darwin’s writings in 1858 (Raby, 2001). Gregor Mendel was a friar who gained posthumous fame as the founder of the modern science of genetics. His pea plant experiments established many of the rules of heredity, now referred to as the laws of Mendelian inheritance (Weiling, 1991). These individuals were largely pursuing research because of an innate interest in particular topics or questions (Vetter, 2011) and were recognized experts in their field, conducting research indistinguishable from today’s professional scientists.

On a different level of participation, though not yet called citizen scientists, general people have also been involved in scientific activities on a volunteer basis for centuries, documenting observations of nature. Farmers, hunters and amateur naturalists were some of the activities involved in collecting natural world data (Miller-Rushing et al., 2012). In the 18th century, Carl Linnaeus, collected, with the help of many volunteers, animal, plant, rock and fossils specimens and artifacts from around the world. For 1200 years court diarists in Kyoto, have been recording dates of the traditional cherry blossom festival (Primack, Higuchi, & Miller-Rushing, 2009) and in China citizens and officials have been tracking outbreaks of locust for at least 350 years (Tian et al., 2011).

In some specific science issues, such as weather, astronomy and birds surveys, there is a long history of citizen science, particularly in Anglo-Saxon countries and center and northern European countries such as England, United States of America, Australia, Netherlands or Finland.

The project National Weather Service - Cooperative Observer Program (NWS-COOP) has been collecting basic weather data across United States since 1890 with results supporting much of what we know about variability and directional changes in climate (Miller-Rushing et al., 2012). With a two-
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