

Tributes to Francisco José de Caldas: New expeditions and hybrid practices in Art and Science

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Abstract

This paper consists of a biographical presentation of the polymath Francisco José de Caldas and two programs inspired by him that aim to bridge art and science practices. Caldas mastered several disciplines from biology to journalism and was a key figure in Colombian independence more than 200 years ago. The University of Caldas is leading two programs that are inspired in Francisco José de Caldas legacy to promote hybrid practices and integrative thinking. Exposure to multiple disciplines with collaborative tools can help not only individuals but also teams to generate hybrid practices that integrate complex broad knowledge.

Keywords

Hybrid practices, polymath, Francisco José de Caldas, art and science, expeditions.

Introduction

2018 is the year of the 250th birth anniversary of the scientist and humanist Francisco José de Caldas, who pioneered expeditions to American territories at the beginning of 19th century. Caldas was considered a polymath because of his broad knowledge of art, technology, biology, astronomy, and geography. Caldas, similarly to Leonardo da Vinci, Albert Einstein, or Benjamin Franklin, had extensive abilities to make hybrid connections between arts and sciences. He served in expeditions to territories with permanent innovations and the creation of complex devices. This paper is a brief description of Caldas' hybrid practice and two proposals of integrative knowledge production in the province of Caldas, Colombia called "Caldas: Expedition 21st Century" and "Science Center Francisco José de Caldas."

There is a great deal of recent interest in hybrid practices and integrative knowledge. For instance, the international STEAM movement, which proposes to include art in STEM (science, technology, engineering, and mathematics) initiatives (see Malina, Strohecker, & LaFayette, 2013). This interest is usually coupled with the criticism to the reductionist

thinking in sciences. Understanding history and achievements of polymaths should shed light on how to promote transdisciplinary thinking and support and help to develop programs that focus on hybrid practices.

Francisco José de Caldas

Caldas, as a scientist, military official, journalist, and writer, contributed not only to discover immense Colombian natural resources, but also fought for national independence. Today, he is remembered by his direct participation that led to the independence on July 20th of 1810. Caldas helped to build a memory of the causes and cruelties of conquest and colonization. In 1816, Caldas was captured by Spanish royalist Pablo Morillo, who ordered his execution.

Caldas had a constant interest in critical thinking and science. He contributed to the first studies in geography and engineering. He was the first Colombian cartographer and critical studies about climate, military science, economy, politics, and history. Caldas invented the hypsometer, which is a thermometer that measures the attitude depending on the boiling point of water. He used this device to elaborate an atlas of the New Kingdom of Granada, which included details such as the geography of the Magdalena river (the longest in Colombia) and the altitude of the Tolima snow peak.

Francisco José de Caldas worked in biology, astronomy, and engineering. He participated in the Royal Botanical Expedition to New Granada as a biologist and collected more than 5,500 flora species. He also was in charge of the National Astronomical Observatory in Bogotá, that was built by the Spaniard scientist José Celestino Mutis. Caldas led the observatory to become a science center for astronomy and geography. He is considered the father of Colombian engineering because of his works after the independence.

Late Caldas was politically active, a military and a journalist with a nationalist commitment. Caldas used the observatory to facilitate political meetings of other pro-in-

dependence figures such as Camilo Torres and Antonio Nariño. Later he was a senior officer with engineering responsibilities in the army and was the editor of the first official newspaper.

Two recommended biographies of Francisco José de Caldas are in the works of Jaramillo Gonzales (2010) and Plazas Galindo et al. (2017). Caldas' execution was widely lamented and his legacy has been recognized permanently through Colombian national history.

Caldas: Expedition 21st Century

In Colombia, there have been several tributes to, as known in the nation, 'savant' Caldas, but unnoticed by many. The province Department of Caldas and its main higher education institution, University of Caldas, honor Francisco José de Caldas with their names. In 2018, it is the 250th anniversary of Caldas birth; to pay tribute, the university has proposed the program "Caldas: Expedition 21st Century," which aims to study the contemporary status of regional science, territory, society, art, and culture using similar approaches and routes defined by the savant Caldas more than two centuries ago.

This Caldas new expedition is a collaborative program for learning, outreach, and research for the region. One of the goals is to foster collective construction with spaces for discussion such as think tanks and forums. In the program also participate other public and private institutions are invited. The core values of the program are inclusion, multidisciplinary work, educative impact, and connection with society. The program encourages interactions between academics (students and faculty) and local people and institutions to foster knowledge exchanges and collaborative work.

The core areas of the expedition are broad and represent the traditional strengths of the university:

- Agricultural sciences, biodiversity and natural resources
- Natural and physical sciences
- Engineering, technology, and development
- Social innovation
- Social and juridical sciences
- Economy and society
- Design and culture
- Memory and heritage
- Education and pedagogic practices
- Climate change
- Peace

In this scenario, it has been expected that several projects are proposed with a broad goal to identify the inventory of resources in the region. A representative case is an expedition to the Florencia Wilderness located in the municipality of Samaná. This place preserves a large amount of biodiversity and needs conservation policy for its protection. The wilderness is a hydrological resource that is endangered by new inhabitants (see Figure 1). It includes several streams that later turn into rivers that feed La Miel dam or provide a source of drinking water for the region.



Figure 1. Hydrological resources in Florencia Wilderness

One of the requirements of the projects is to define a georeferenced database of the findings. This will help to protect the intellectual property of material and immaterial assets. In the Florencia Wilderness expedition, the participants studied four groups of species: Periphyton, plankton, bacteriological and aquatic macroinvertebrates (see figure 2). Biologists, artists, engineers, and museographers study 75 amphibian species, 278 bird species, and 65 mammal species. From these studies, they have done digital cartographies, critical curatorship, algorithmic analyses, and multimedia musical compositions. These works are exhibited in the University Museums Center and are promoted with the community in collaborative networks.



Figure 2. Species in Florencia Wilderness

Caldas: Expedition 21st Century, beyond a program, seeks to join common interests and goals. The spirit is to develop an appropriate territory for the inhabitants and nurture children and youths to learn about the region of Caldas in a cooperative and interactive environment.

Science Center Francisco José de Caldas

Another program that pays tribute to savant Caldas is the Science Center Francisco José de Caldas. The program is part of a national policy that aims to create science centers that facilitate social appropriation of science and technology. The goal of the center is to enable citizen participation in the scientific culture. This will be a space for exchanges between artists, scientists, and citizens using collaborative strategies supported by cases directed to solve local challenges (see figure 3).



Figure 3. Representations of the Science Center

The center is based on the concept of ‘maker culture,’ which is related to the development of technical and scientific skills for general citizens and, at the same time, creative thinking and concrete problem solving are at the center. Papavlasopoulou, Giannakos, and Jaccheri (2017) argued that ‘maker’ activities are a broad and constructivist way to acquire knowledge where the learner is in the center of the process (p. 58).

Inspired by the polymath Francisco José de Caldas, the Science Center is a program that seeks to integrate physical, scientific, artistic, and cultural practices with democratic access. The outcomes are expected to be based on hybrid practices.

Conclusion

Legendary figures such as Francisco José de Caldas inspire the pressing demand for integrated and transdisciplinary knowledge and actions. Broad critical thinking is the key to understand historical and contemporary resources and needs of any region as a basis to solve social and environmental complex challenges we are to address in the near future. The savant Caldas follow both scientific and humanistic paths that are and will be more pertinent.

The goal is not centered in nurturing more contemporary polymaths, which could be challenging. The ability to be creative in more than one disciplinary area is rare, but not

impossible (Kaufman, Beghetto, Baer, & Ivcevic, 2010). Yet, exposure to multiple disciplines with collaborative tools can help not only individuals but also teams to generate hybrid practices that integrate complex broad knowledge. Caldas is our local inspiration for these merged art and science practices, we pay tribute to him.

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