

## **Environmental Change since the Dawn of Humanity**

### **A Global Interdisciplinary Research Project Based on Scientific Collections**

#### **Preliminary Proposal**

**to be discussed at the SciColl conference in Brussels (8-9 February, 2010)**

What impacts has the rise of the human species had on Earth's environment, including the geosphere, biosphere, hydrosphere, and cryosphere? This research challenge is the basis for deciding if humans can live sustainably on Earth, and for guiding public policies that can ensure our success as a species. Object-based scientific collections are critical resources in meeting this research challenge because they provide us with the first line of evidence of environmental change over time. For this reason, Scientific Collections International (SciColl ; [www.scicoll.org](http://www.scicoll.org)) is proposing a global research initiative "Environmental Change since the Dawn of Humanity".

#### **Scientific collections and global climate change research**

The most intense research has focused on climatic change driven by the accumulation of greenhouse gases driven by the use of carbon-based fuels and industrialization. This research relies on diverse lines of evidence that allow comparison of the environment before, during, and after the rise of industrialization. Several of the most important bodies of evidence in this research community rely on scientific collections, such as:

- Paleotemperature reconstructions going back millions of years, estimated from isotopic study of fossil and subfossil biomaterials in scientific collections; and
- Atmospheric chemistry, especially CO<sub>2</sub> levels trapped in bubbles in collections of stratigraphic ice records covering hundreds of thousands of years.

#### **Collections and the history of environmental change**

Without minimizing the critical importance of these lines of climate change research, climate is only one aspect of environmental change. The following other dimensions of environmental change (to name but a few) may be unrelated to climate change, or only indirectly related:

- Landform changes due to tectonism and superficial weathering processes;
- Landscape changes due to ecosystem dynamics and biological evolution;
- Habitat changes due to ecological processes, migration patterns of populations, and biological evolution;

- Changes in distribution patterns of surface and groundwater due to landscape evolution and sedimentation.

This wider view of environmental change leads to two other questions that can broaden and deepen our understanding of climate change and the role that humans play in driving it:

- 1) What other lines of evidence on environmental change can be brought to bear on climate change research, to:
  - a) Document the direct and indirect effects of climate change on other components of the environment?
  - b) Establish a better pre-human baseline, and to document human impact on many dimensions of climate and the environment?
  - c) Provide independent evidence for or against climate change reconstructions?
- 2) What impact has environmental change had on humans in terms of:
  - a) Population distribution and migration patterns?
  - b) Patterns of genetic similarity and variability?
  - c) Rise and spread of infectious diseases?

### **Goals of the SciColl Brussels Conference**

The SciColl conference will include approximately approximately 70 participants, including research specialists in environmental change and leaders of scientific collections who will represent a wide range of disciplines. During the conference, they will exchange information on:

- the range of scientific challenges that can contribute to research on environmental change and human impacts;
- issues concerning access to scientific collections and their associated information; and
- SciColl's plans for the international coordination of scientific collections and the interdisciplinary research that relies on them.

Conference participants will then focus on key issues related to the design of SciColl's proposed research initiative, such as:

- Which types of collections should be the highest priority for cataloging, digitizing, and coordinating for the needs of this research initiative?
- What improvements in documentation and access to collections will be needed for the proposed research?
- Should the initiative focus on particular regions and time intervals or should it take a more global approach?