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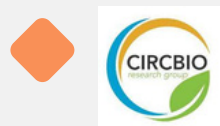
InformBio project – The importance of monitoring and modelling the environment

In this article, we discuss the importance of data to support decision making and policy development

8 min read



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At the end of 2022, 8 billion people live on our planet; by 2057 that number is expected to rise to 10 billion. The current and future situation with our population is creating urgent concerns on a global level, including food security and environmental issues. Since 1981, the temperature of the Earth has risen by 0.18°C per decade. 2021 was the sixth-warmest year ever, the surface temperature was 1.04°C warmer than the pre-industrial age. Nine years between 2013 and 2021 are among the ten hottest on record (Figure 1).

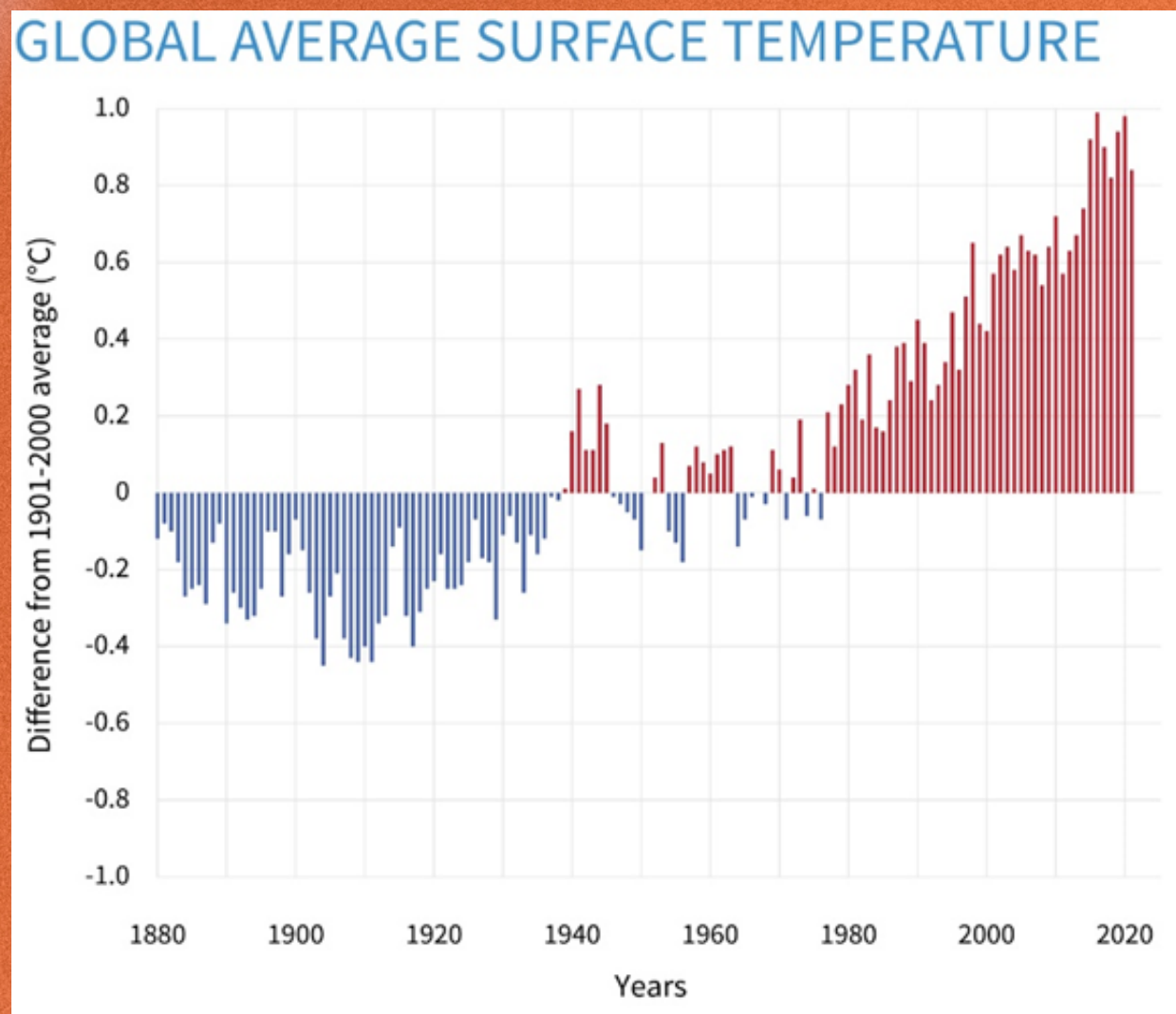


Figure 1. Global average surface temperature from 1901 to 2020 in $^{\circ}\text{C}$

The European Commission is highly involved and concerned about this situation, covering nearly all EU policies with the Paris Agreement objective of keeping the global temperature increase below 2°C and to keep working on maintaining it to 1.5°C. Therefore, one of the key objectives of recent years has been the global transition to sustainable development, leading to the creation of several policies, strategies, technologies, and movements.

The circular bioeconomy is an integrated concept of the circular economy and bio-economy; the core idea behind it is to create value, i.e., economic value, as well as creating a sustainable and greener environment, therefore, supporting the Paris Agreement and the European Commission vision. It aims to create valuable bio-products by recycling, reusing, remanufacturing, and maintaining a sustainable manufacturing process, i.e., a low carbon economy.

The low carbon economy is also known as carbon neutrality, a global objective which many countries have committed to achieve by 2050. These include, the European Union, United Kingdom, United States, Japan, the Republic of Korea and more than 110 other countries. China has pledged to get there before 2060.

To achieve those ambitious goals, a need for monitoring the circular bioeconomy development of the mentioned countries arises. As well as the need of anticipation or modelling scenarios for future and possible cases.

Monitoring helps to understand and protect the planet; policy makers, researchers, and the public rely on monitoring systems as their "eyes and ears." The collection, assessment and publication of continuous or periodic information is what monitoring means. The key is the observation and analysis of natural variation or changes as well as human pressures and their consequences on people and the environment.

To be the eyes and ears, monitoring needs indicators, to follow and measure the development of the circular bioeconomy. An indicator is a tool like a pH strip that changes colour if the medium's characteristics changes. It measures quantitatively or qualitatively whatever thing that must be measurable, comparable, replicable, and responsive to fluctuations in the development of the environment. Therefore, indicators, as "eyes and ears" of policymakers and other stakeholders, help them understanding and interpreting results, reveal trade-offs between policy measures, and formulate clear targets for their policies.

Indicators need a framework, areas to focus on, data collection, methodologies to assess them, tools and more importantly, periodicity to give a sense of time to the monitoring activity. Updating a monitoring system is as important as choosing and having the right indicators.

Scenario modelling helps creating several alternative views of how the future might play out rather than forecasts. This is known as the creation of hypothetical future states or scenarios of the world that give alternative plausible outcomes under various assumptions (Figure 2).

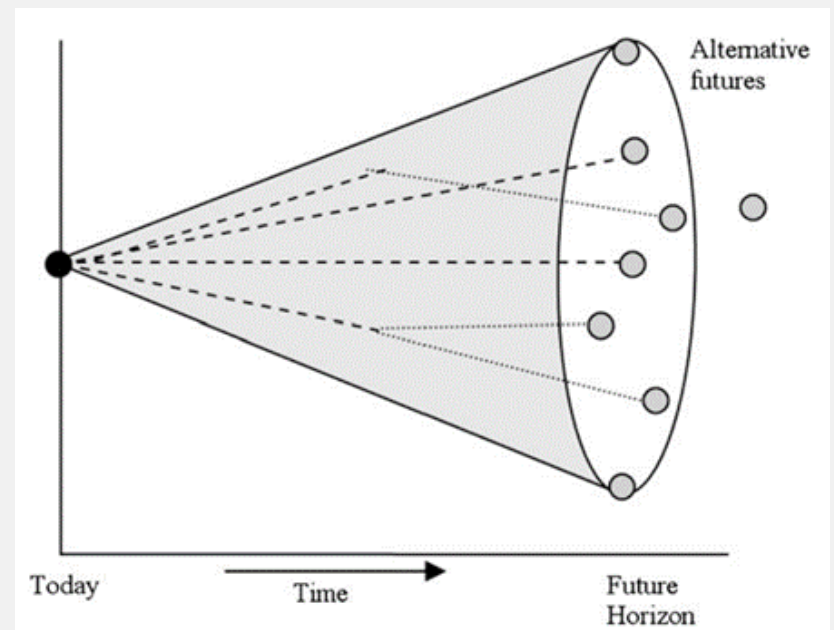
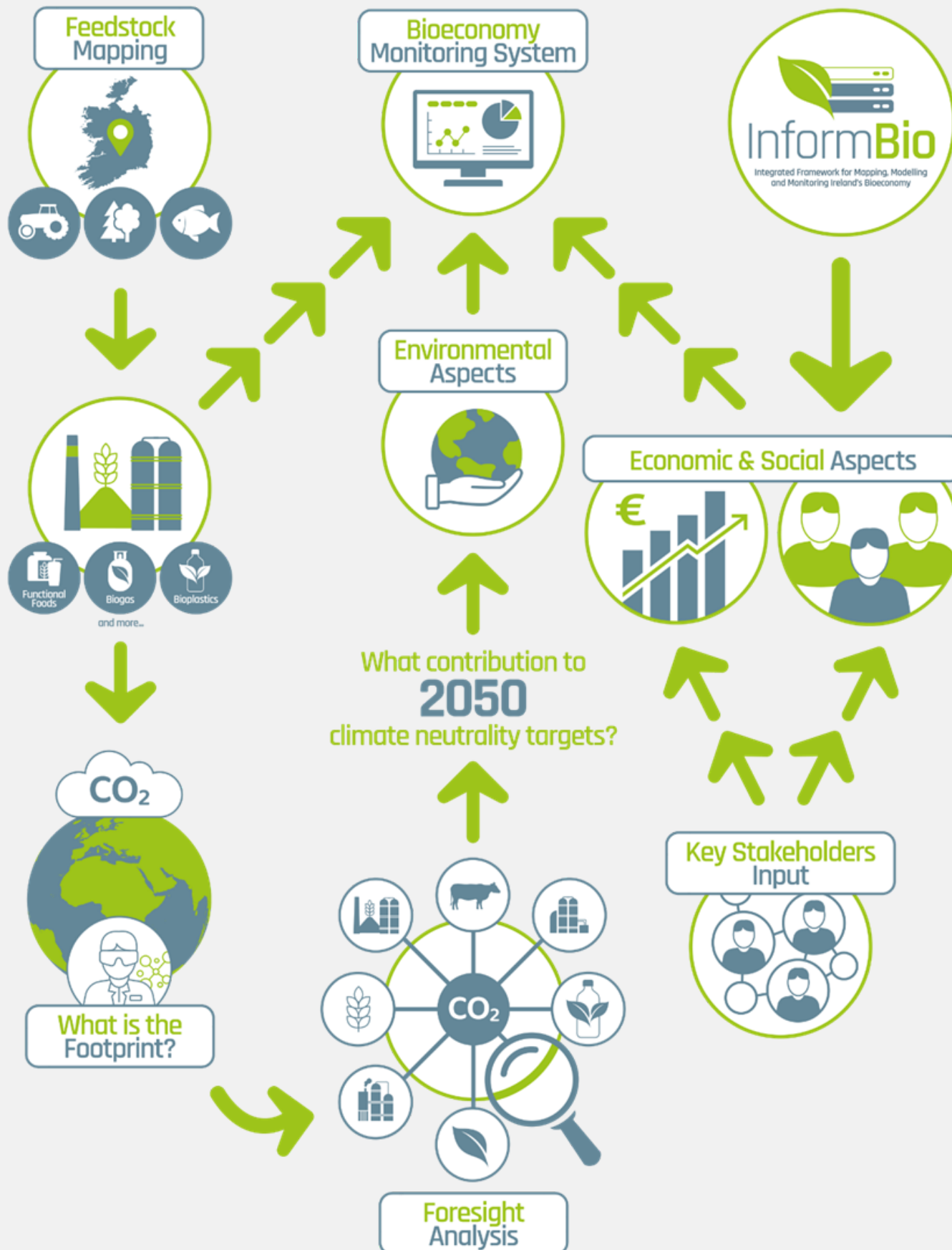


Figure 2. Conceptual diagram of a scenario funnel.

Scenario studies provide evaluation of system vulnerabilities and potential for adaptation strategies by exploring and evaluating plausible future scenarios. Policymakers can use scenarios to guide and conduct strategic planning for impacts outlined by resulting possible futures. By bridging the gap between scientists and decision-makers and bringing issues of immediate concern to the fore, scenario modelling can result in more informed decisions, and therefore, better informed policies.

Monitoring and scenario modelling are two of the techniques that the InformBio project integrates to study circular bioeconomy in Ireland, with one big commitment: to achieve carbon neutrality by 2050. Understanding the potential of bioeconomy pathways to contribute to this target is essential for government, industry, and other value chain actors to make decisions on which bio-based value chain opportunities to pursue (Figure 3).

What is InformBio?



InformBio will support preparations for a bioeconomy observatory for a sustainable and circular bioeconomy. The project will deliver a Bioeconomy Foresight Analysis providing a clear roadmap for Ireland towards a sustainable bioeconomy, along with the tools to rigorously measure progress towards this objective. InformBio combines data driven research, analysis, and modelling with input from expert thematic groups, ensuring robust and informed outcomes for industry, policy makers and other relevant groups.

By integrating biomass mapping, value-chain analysis, life-cycle assessment and scenario modelling, the project, for the first time, attempts to quantify the potential of the bioeconomy to contribute to Ireland's climate and sustainability targets. Moreover, the project positions Ireland as a front-runner among EU member states, by developing a prototype national bioeconomy monitoring system, enabling Ireland to track the development and progress of the bioeconomy against key bioeconomy indicators.

The tools that InformBio is going to use for the creation of that bioeconomy observatory are mainly three, Bioresource Mapping Tool, GOBLIN Model and Bioeconomy Monitoring Framework. Learn more about the tools in <https://informbioproject.ie/informbio-tools/>.

The InformBio project is funded by the Department of Agriculture, Food and the Marine and is a collaboration between Munster Technological University, Teagasc, University of Galway and the Central Statistics Office.