

## Lesson Plan: Teaching Cost-Benefit Analysis through Climate-related examples

As an **undergraduate Economics** teacher, you can use this set of computer-based tools to help you in teaching **cost-benefit analysis**.

This lesson plan will help students to understand the principles of cost-benefit analysis. The activities will allow students to apply cost-benefit analysis to global climate change, in general, and to carbon abatement (an action to mitigate climate change).

Thus, the use of this lesson plan allows you to integrate the teaching of a climate science topic with a core topic in Economics.

Use this lesson plan to help your students find answers to:

- *Explain the principles of cost-benefit analysis.*
- *What are the possible limitations of measuring the costs of climate change in terms of the GDP?*
- *How can cost-benefit analysis be applied to carbon emissions abatement?*

### About the Lesson Plan

<b>Grade Level</b>	Undergraduate
<b>Discipline</b>	Economics
<b>Topic(s) in Discipline</b>	Cost-Benefit Analysis, Carbon Abatement, Energy, Economics, and Climate Change
<b>Climate Topic</b>	Energy, Economics, and Climate Change; Policies, Politics, and Environmental Governance

	Mitigation
<b>Location</b>	Global
<b>Access</b>	Online, Offline
<b>Language(s)</b>	English, one resource also available in French
<b>Approximate Time Required</b>	150 – 180 min

## 1 Contents

- 1. Reading (20 – 30 min)** A reading that introduces the principles of cost-benefit analysis.  
<http://www.sjsu.edu/faculty/watkins/cba.htm>
- 2. Reading (~45 – 60 min)** A reading to discuss the economic analysis of climate change and specifically, cost-benefit studies of global climate change. Also available in French.  
Ch. 2 (Economic Analysis of Climate Change), pg. 15-25 (Cost-Benefit Studies of Global Climate Change)  
[http://www.bu.edu/eci/files/2019/06/The\\_Economics\\_of\\_Global\\_Climate\\_Change.pdf](http://www.bu.edu/eci/files/2019/06/The_Economics_of_Global_Climate_Change.pdf)
- 3. Classroom/Laboratory activity (~80 min)** A classroom/laboratory activity to perform cost-benefit analysis of carbon emissions abatement.  
[https://serc.carleton.edu/integrate/teaching\\_materials/carbon\\_emissions/unit5.html](https://serc.carleton.edu/integrate/teaching_materials/carbon_emissions/unit5.html)

4. **Suggested questions/assignments for learning evaluation**

- Explain the principles of cost-benefit analysis.
- What are the possible limitations of measuring the cost of climate change in terms of the GDP?
- How can cost-benefit analysis be applied to carbon emissions abatement?

## 2 Step-by-step User Guide



Here is a step-by-step guide to using this lesson plan in the classroom/laboratory. We have suggested these steps as a possible plan of action. You may customize the lesson plan according to your preferences and requirements.

1. **Introduce the topic by using a reading**

Introduce the topic of cost-benefit analysis and its principles by using the reading "[An Introduction to Cost Benefit Analysis](#)".

The reading "An Introduction to Cost Benefit Analysis" from Thayer Watkins, Department of Economics, San Jose State University is available at <http://www.sjsu.edu/faculty/watkins/cba.htm>.

2. **Discuss the topic in more detail by using another reading**

Next, introduce the economic analysis of climate change and discuss cost-benefit studies of global climate change by using the reading "Economic Analysis of Climate Change: Cost-Benefit Studies of Global Climate Change" from "[The Economics of Global Climate Change](#)".

The reading, "Economic Analysis of Climate Change: Cost-Benefit Studies of Global Climate Change" is in Ch. 2 (pg. 15-25) of "The Economics of Global Climate Change", written by Jonathan M. Harris, Brian Roach, and Anne-Marie Codur, Global Development and Environment Institute, Tufts University, and is available at: [http://www.bu.edu/eci/files/2019/06/The\\_Economics\\_of\\_Global\\_Climate\\_Change.pdf](http://www.bu.edu/eci/files/2019/06/The_Economics_of_Global_Climate_Change.pdf)

This reading explores and compares the methodology used by various economic models for cost-benefit analysis of climate change.

- Go to [http://www.bu.edu/eci/files/2019/06/The\\_Economics\\_of\\_Global\\_Climate\\_Change.pdf](http://www.bu.edu/eci/files/2019/06/The_Economics_of_Global_Climate_Change.pdf)
- Read the section “Cost-Benefit Studies of Global Climate Change” (pg. 15-25) from Chapter 2, “Economic Analysis of Climate Change”.

This resource is also available in French [here](#).

### 3. Conduct a classroom/laboratory activity

Now, explore the topic further through a hands-on activity, “[Abating Carbon Emissions](#)”, to perform cost-benefit analysis for carbon emissions abatement.

The classroom/laboratory activity “Abating Carbon Emissions”, developed by Gautam Sethi (Bard College), Curt Gervich (SUNY Plattsburgh), and Robyn Smyth (Bard College), is available at [https://serc.carleton.edu/integrate/teaching\\_materials/carbon\\_emissions/unit5.html](https://serc.carleton.edu/integrate/teaching_materials/carbon_emissions/unit5.html).

In this activity, carbon abatement is considered to be an action that will mitigate climate change, and the costs and benefits of abating carbon emissions are calculated.

- Go to [https://serc.carleton.edu/integrate/teaching\\_materials/carbon\\_emissions/unit5.html](https://serc.carleton.edu/integrate/teaching_materials/carbon_emissions/unit5.html).
- Download the Teaching Materials and reading material.
- Conduct the activities as described in Part 1 and Part 2 of the unit at [https://serc.carleton.edu/integrate/teaching\\_materials/carbon\\_emissions/unit5.html](https://serc.carleton.edu/integrate/teaching_materials/carbon_emissions/unit5.html).

### 4. Questions/Assignments

Use the tools and the concepts learned so far to discuss and determine answers to the following questions:

- *Explain the principles of cost-benefit analysis.*
- *What are the possible limitations of measuring the cost of climate change in terms of the GDP?*
- *How can cost-benefit analysis be applied to carbon emissions abatement?*

## 3 Learning Outcomes

The tools in this lesson plan will enable students to:

- describe cost-benefit analysis
- apply cost-benefit analysis to global climate change
- apply cost-benefit analysis to carbon emissions abatement

## 4 Additional Resources



If you or your students would like to explore the topic further, these additional resources will be useful.

### 1. **Micro-lecture (video)**

A micro-lecture (video), “Quantifying the Economic Cost of Climate Change”, delivered by Solomon M. Hsiang, Climate Risk Expert and U.C. Berkeley Professor of Public Policy, from [RMSConnection](#):

[https://www.youtube.com/watch?v=yNYZJD\\_llno](https://www.youtube.com/watch?v=yNYZJD_llno)

## 5 Credits/Copyrights

All the teaching tools in our collated list are owned by the corresponding creators/authors/organizations as listed on their websites. Please view the individual copyright and ownership details for each tool by following the individual links provided.

We have selected and analyzed the tools that align with the overall objective of our project and have provided the corresponding links. We do not claim ownership of or responsibility/liability for any of the listed tools.

- 1. Reading, “An Introduction to Cost Benefit Analysis”**  
Thayer Watkins, Department of Economics, San Jose State University
- 2. Reading, “Economic Analysis of Climate Change: Cost-Benefit Studies of Global Climate Change” from “The Economics of Global Climate Change”**  
Jonathan M. Harris, Brian Roach, and Anne-Marie Codur, [Global Development and Environment Institute, Tufts University](#) and [Global Development Policy Center, Boston University](#).
- 3. Classroom/Laboratory activity, “Abating Carbon Emissions”**  
Gautam Sethi (Bard College), Curt Gervich (SUNY Plattsburgh), and Robyn Smyth (Bard College); available on [SERC’s InTeGrate portal](#)
- 4. Additional Resources**  
Solomon M. Hsiang, Climate Risk Expert and U.C. Berkeley Professor of Public Policy; from [RMSConnection](#)