Preface

It was six men of Indostan
To learning much inclined,
Who went to see the Elephant
(Though all of them were
blind),
That each by observation
Might satisfy his mind.
⋮
And so these men of Indostan
Disputed loud and long,
Each in his own opinion
Exceeding stiff and strong,
Though each was partly in the
right,
And all were in the wrong!

Moral.

So oft in theologic wars
The disputants, I ween,
Rail on in utter ignorance
Of what each other mean,
And prate about an Elephant
Not one of them has seen!
[1, pp. 259–261]

—John Godfrey Saxe

In 1992, the Union of Concerned Scientists published the *World Scientists' Warning to Humanity*,[1] an appeal for humanity to "bring environmentally damaging activities under control to restore and protect the integrity of the earth's systems we depend on" [2]. The *Warning* stated that "[h]uman beings and the natural world are on a collision course," warned of "[h]eedless exploitation" of natural resources, and explained that "[d]estructive pressure" on water, soil, and atmosphere "put at serious risk the future that we wish for human society... ." More than two decades later, we are encountering limits to the rates at which natural resources can be extracted, limits for the rate at which wastes (including anthropogenic carbon emissions) can be assimilated by the biosphere, and limited options for human ingenuity to substitute for depleted natural capital and diminished ecosystem capacity. Because of these factors, the future health and viability of all economies are at risk [3].

In contrast, the vast majority of economists and policy makers predict that the quality of life into the future will continue to improve. Economists point out that standards of living have increased steadily over time, and living standards for even

[1] The *World Scientists' Warning to Humanity* was signed by some 1700 of the world's leading scientists, including the majority of Nobel laureates in the sciences.

the poorest nations are "accelerating markedly" [4]. They expect GDP per capita and living standards to grow continuously into the foreseeable future, even under the most pessimistic assumptions [4, p. 170]. The Organisation for Economic Co-operation and Development (OECD), for example, forecasts an average global GDP growth rate of approximately 2 % per year for the next several decades [5, Table A.1].

There is a stark contrast between these two visions of the future, because the two groups (scientists and economists) focus on different parts of the economy. Scientists observe the planet's natural capital dwindling, and foresee declining quality of life. Economists observe the stock of manufactured capital growing, and growing increasingly efficient, and foresee continued improvement in the quality of life.

The differences between scientists and economists revolve around the understanding and role of capital. Physical scientists often focus on the dependence of our living standards on the availablility of natural capital, but ignore the multiplying power of manufactured capital. Conversely, economists place their faith in the ability of manufactured capital to continually increase production rates, but ignore constraints of natural capital.

In the ancient fable, six blind men discern six different parts of an elephant and draw different conclusions about the unseen animal before them. Today, scientists and economists discern two different parts of the economy and draw strikingly different conclusions about the unseen future ahead. We contend that both scientists and economists need to take off their blinders and appreciate that capital in all forms (natural, manufactured, human, social, and financial) is necessary to generate the services an economy requires. These two perspectives must be brought together to understand the potential futures we are facing. These two perspectives must inform the data we collect about our economies.

But, what would we do with integrated and comprehensive environmental-economic data, including natural and manufactured capital, if they were routinely and readily available? The goal of this book is to answer that question. Herein, we develop an accounting framework and analysis approach that could take advantage of such data, and we draw several implications from our framework.

We look forward to the day when such data are readily available!

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