

economy and the human brain.

As a result, we lack a concept that we desperately need. We need it to understand and communicate, for instance, about the greatest moral issue of our time—global warming. The ecology is a system operating via systemic causation. Without an everyday concept of systemic causation, global warming cannot be properly comprehended. In other words, without the systemic causation frame, the oft-repeated facts about global warming cannot make sense. With only the direct causation frame, the systemic causation facts of global warming are ignored. The old frame stays, and the facts that don't fit it cannot be comprehended.

The Structure of Systemic Causation

Systemic causation has a structure—four possible elements that can exist alone or in combination. Driving a complex, systemic problem, there can be one, two, three, or all four of these elements in play. Here is how they might be explained in conversations about global warming.

A network of direct causes. (1) Global warming heats the Pacific Ocean.

That means that the water molecules in the ocean get more active, move with more energy, evaporate more, and move in the air with more energy.

(2) Winds in the high atmosphere over the ocean blow from southwest to northeast, blowing the larger amount of high-energy moisture over the pole. (3) In winter, the moisture turns to snow and comes down over the East Coast as a huge blizzard. Thus, global warming can systemically cause major blizzards.

Feedback loops. (1) The arctic ice pack reflects light and heat. (2) As the earth's atmosphere heats up, the arctic ice pack melts and gets smaller. (3) The smaller amount of arctic ice reflects less light and heat, and more heat stays in the atmosphere. (4) The atmosphere gets warmer. (5) The feedback loop: Even more arctic ice melts, even less heat is reflected, even more heat stays, even more ice melts, and on and on.

Multiple causes. Because of the interaction between the polar vortex and the jet stream, parts of the vortex move south into central North America