NAEC Integrative Economics

Session 4: A Systems Approach to Environmental Challenges

Opening remarks
Irena Sodin, Ambassador to the OECD, Permanent Representative of Slovenia

We need to take a systems approach to environmental challenges for the very obvious reason that the environment is a system, and it is a system that interacts with the other systems we are discussing at this conference.

But what kind of system is it? The answer to this question determines how we view environmental challenges and the way we design policies to meet them. If we see it as a linear system, then climate change for example follows a path we can extrapolate from the available data with milestones we can identify on the road ahead. We can see how things may get steadily worse if we don't do certain things by certain dates.

But the environment is not a linear system. It is a complex, adaptive system, and as such has certain characteristics we have to understand, or else our actions will be at best ineffective and may even be dangerous. I would like to mention a few of these characteristics briefly. Characteristics like tipping points. A natural system may change slowly and regularly over a long period, giving us the impression that there is time to solve the problems, find solutions. But when it reaches a tipping point, change can be brutal and catastrophic. Climate history illustrates this well, with long periods of relative stability, followed by short periods of change – ice ages for example – before the system reaches a new equilibrium. It is important to note that this new equilibrium means that the system enters a new state. It does not "get back to normal". Fisheries can vanish in two or three months following decades of apparently predictable slow decline and the fish never come back. (In a different domain, the same goes for certain types of job).

Linked to this is emergence. We know that the system is evolving, and we need a simplified representation, to help us analyse it. The representative agent is one such model, but in a complex system, states emerge from the interactions of multiple actors whose goals may be in conflict, and whose means to achieve these goals differ widely. In such a system, you cannot predict the behaviour of the whole system by extrapolating from the behaviour of an individual because the system as a whole will show properties that are different from those of its component parts. The more so when we talk about "the environment" which emerges from the interactions of multiple systems with innumerable components at scales ranging from the Earth's biosphere down to cells, molecules, and atoms.

This implies radical uncertainty, what the economists call Knightian uncertainty, and Donald Rumsfeld famously labelled "unknown unknowns". Things that we cannot calculate or predict because they are outside our previous experience. In everyday life, the role of the internet would be a good example. In its Fifth Assessment Report in 2014, the Intergovernmental Panel on Climate Change (IPCC) acknowledges that there are

uncertainties that we will never know and that the best response is to understand and cope with them.

That brings us back to the policy question: cope with them how? There are basically two types of response, summed up over four centuries ago by Shakespeare in Hamlet's famous "To be or not to be". Is it nobler in the mind to suffer the slings and arrows of outrageous fortune, or to take up arms against a sea of troubles? Until recently, the consensus would have been to take up arms against the sea, or your other problems. This is the basis of conventional risk management. Fight the problem and stop it happening. But however big your wall, sooner or later, the sea, or people, will find a way over, under or around it.
So a new approach is emerging from the study of complex systems, an approach based on reinforcing an important system characteristic: resilience. A resilience approach accepts that all systems might fail. This approach focuses on the ability of a system to absorb, recover from, and adapt to a wide array of shocks to help individuals, communities, and larger groupings not just to deal with adversity, but to adapt to change in a positive way and take advantage of the opportunities it offers.

Adopting such an approach means rethinking our priorities, and especially the role of optimisation and efficiency. Systems science teaches us that when you try to optimise one art of a complex system, you can end up destabilising the system as a whole. And there is a trade-off between efficiency and resilience. We see that in global supply chains, surely one of the most efficient components of the international economy. But what happens when your just-in-time workflow is disrupted by shock such as coronavirus or new border controls? Maybe just-in-time needs a dose of just-in-case.

We are seeing a shift towards a resilience-based approach in at least the discussions around environmental challenges in a number of countries. In Australia, for instance, as a result of the recent wildfires, or at the other extreme in England following severe flooding. Unfortunately, it usually takes a catastrophe to change people's minds. But they are changing. People everywhere see that the way humans have changed the environment is having an impact on their daily lives, and usually for the worse.

But we can't, or rather shouldn't, make policy on the basis of anecdotes, however powerful. That is why I am pleased to attend this session today and to hear how you are developing the tools and analytical techniques we need to understand the issues and propose pragmatic, effective policy responses.