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Guest Editorial

Including Humans in (Earth System) Modelling

In these days of rapid global environmental change, we are indebted to the natural and life sciences to have clearly and persistently made the case since the 1990's that if we do not 'do something', our Earth system will soon change so dramatically that we may no longer recognise it. As a result, many individuals, but also (some) governments and a number of important corporations, are realising that something has to be done, and that it can be done without major threat to our way of life -- if we do it *now*.

We also think we know how to combat some of the phenomena involved: for example, the greenhouse gas emissions that are transforming our climate, and future water shortages. But these solutions, even if we can implement them, do no more than deal with external manifestations of much more deeply rooted causes.

These causes may at first seem 'environmental', but upon reflection, we as humans define: (1) what our environment is, (2) what our environmental problems are, (3) what we think are the solutions to these problems. And then (4) we try and implement these solutions. We cannot escape the conclusion that the *apparently* environmental problems are in reality socioenvironmental problems, born out of the interaction between our societies and their environments. The reason for including humans in Earth system modelling, therefore, is neither more nor less than that without understanding our societies we cannot even begin to solve our 'environmental' problems.

Until recently, that was where many efforts were stymied, there were not many social scientists interested in environmental matters, and when they were they saw them so differently, and spoke such a different language, that working with natural and life scientists was often doomed to failure. That situation, however, is changing rapidly. The increase in attendance at the IHDP Open Science Meetings, as well as changes in strategy among the funding agencies, many more 'environment' sessions at national and international social science meetings, etc., all testify to a growing readiness on the part of the social sciences to be involved.

Modelling is a very good starting point for trans-disciplinary activities. They focus the mind, are powerful tools to help us understand complex dynamical relationships, are easily modified and poly-interpretable, but can be made sufficiently realistic to correct our thinking about the phenomena at hand. Yet they differ from reality in the sense that experimenting with them has no consequences in real life.

In recent years, modelling has spread widely beyond economics into the other social sciences. Models of human-environmental interaction abound at different spatial and temporal scales; other models explore decision making under uncertainty in the management of large-scale irrigation systems; yet others the role of institutions managing common pool resources.

Several such models were presented at the Earth Systems Science Partnership's first Open Science conference in Beijing, last November, in a very successful session. It seems therefore that the first steps are being taken in meeting the challenge of including humans in Earth systems modelling. But it is quite a challenge!

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