

Towards a global understanding

The programme launched in Berne this week to understand the changing environment for human beings on the surface of the Earth is laudable, but needs strong management.

WHO knows the initials IGBP, the acronym for the ugly legend International Geosphere-Biosphere Programme? In spite of the enthusiasm at this week's meeting of the International Council of Scientific Unions at Berne, some time will pass before the name is familiar. One snag is money: many national research enterprises are so short of funds to support bread-and-butter projects that they will ask for more only hesitantly and therefore unconvincingly. The implied hope that similarities with the International Geophysical year will unlock empty purses may be fruitless. Another snag is method: IGBP is a grand idea, and a timely one, nothing less than that of laying the foundations for a thorough understanding of the causes of global environmental changes of all kinds. But the execution of this ambition will not be child's play. In the absence of a peg on which to hang the programme (IGY was planned to span an impending solar maximum), national organisations will be tempted to relapse existing but not particularly significant programmes as their contributions to IGBP. The project will also be at risk of ambush by those who would dramatise local environmental problems by having them elevated to global status. The scientific committee that will guide the programme will need a clear head and a strong nerve.

The first need is for a sense of priority. The agreed starting point is that the scale of human activity on the surface of the Earth is now comparable with the scale of the still poorly understood external influences which regulate the environment. That does not concede the case, morbidly yet fondly put by many who should know better, that the human influence is already so great that we are poised on a knife-edge between disaster and its near-avoidance. The sober anxiety is merely that, in respect of problems such as the influence of atmospheric carbon dioxide on the climate, present capacity to predict the course of events is rudimentary. It is demeaning as well as dangerous not to be able to tell what even the century ahead may hold, which is a sufficient case for IGBP. The programme managers should use that principle to decide which projects they approve.

Oceans

The greenhouse problem is a good illustration of how this philosophically parsimonious principle should apply. The steady accumulation of carbon dioxide in the atmosphere has been observed with ever-greater accuracy and completeness for three decades, but the accumulation is only roughly half as fast as calculated from the known consumption of fossil fuel. Where has the other half gone? Into more vegetation, or into solution in the oceans? If the oceans are an expedient storehouse for an otherwise troublesome atmospheric absorber of solar energy re-radiated from the surface of the Earth, is it permanent or merely temporary; a means by which trouble is postponed? Worse still, why is there still no clear climatic consequence of the accumulation so far recorded, an increase of roughly ten per cent (to 345 parts per million) in only the past thirty years?

Part of the trouble lies in the crudity of even the most sophisticated climatic models used, among other things, to predict that surface temperatures will increase as carbon dioxide accumulates. The models cannot, for example, handle real clouds (which could provide stabilizing influences) rather than mere

average cloudiness, but there are probably many other features of the Earth's atmosphere that are not yet sufficiently well understood conceptually. It remains something between a puzzle and a scandal that the mechanism of the presumed high rate of transfer of carbon dioxide to the oceans has not been confidently identified after three decades of worry about the atmospheric greenhouse. And while evidence has accumulated that the Earth's climate is indeed substantially influenced by external events such as the changing parameters of the Earth's orbit about the Sun there has as yet been no convincing attempt to use this knowledge predictively, no doubt because the other uncertainties are greater than the effects expected from variations of the orbital parameters. In this confusion, it is also possible that the expected climatic changes attributable to carbon dioxide are already under way, but have gone unrecognized because nobody is sure what signals to look for in the seasonal noise.

Tall order

The atmospheric greenhouse shows why IGBP most urgently needs tough-minded management, able to distinguish the problems whose solution will lead quickly to better understanding from those that can be allowed to wait. This will not be an easy task. The intention is that there should be an international scientific committee to give shape to the IGBP, but that there should be no substantial central source of funds for supporting projects, which will have to look to national agencies for support. This is how the IGY functioned, but that success will be hard to repeat. One danger is that existing research programmes will simply be rechristened as components of IGBP without reference to the common objectives of the programme. Another is that, where extra funds can be found, the money will be spent on making many measurements that can be made with relative ease, not on the more difficult investigations on which understanding hangs. This is why the International Biological Programme, one of the successors to IGY (after the International Year of the Quiet Sun) was a relative failure. The new management will have to avoid this pitfall by sheer intellectual persuasion, which is a tall order.

Where will it all lead? The plan is that IGBP should produce within a decade a sufficient basis for making predictions in critical areas valid for a century or so in advance, which is a clarifying objective. But there are many fields, that of earthquake and volcano prediction for example, in which this ambition is unlikely to be satisfied, for which reason IGBP is also properly conceived of as an open-ended programme. One practical danger is that the politicians to whom would-be participants in IGBP must now turn will be demanding, long before a decade is up, to know the results and the implications for public policy. But some of the more important implications are already plain. The atmospheric greenhouse will, for example, require international conventions to restrain the emission of gases absorbing in the infrared, the negotiation of which is even more ambitious than the goals of the IGBP. Is the hidden agenda the hope that international collaboration on the scientific components of the global problems show the politicians show where to begin? That would be a great benefit in its own right. □