Gadgil and Devasia reply:

Ashish Kothari's comments are well taken. IPR specifications are meant to disclose fully how a particular invention was arrived at and to enable another party skilled in the art to practice it. Our suggestion that the specification include information on the biological resource, country/ies of origin and common public knowledge fits in well with this purpose of specification. Once this information is specified, it is straightforward to ask for evidence of prior informed consent of the country/ies and community/ies. It may or may not be advisable to ask for this as a part of the specification by countries which are not yet parties to the Convention on Biological Diversity.

The issue of country of origin needs to be discussed in some depth. The issue of further evolution of genetic variation after introduction of a species outside the country of origin is significant and needs serious scientific assessment. However, the whole purpose of the Convention of Biological Diversity would be defeated if there is to be no tracing a country of origin prior to December 1993.

We do not share Ashish Kothari's optimism that we may yet decide that no intellectual property rights would be allowed on life forms and biotechnologies. GATT insists on IPR's on micro-organisms, microbiological processes and plant varieties. Already there are well established IPR's on products based on biological molecules. Of course, philosophers can and should continue to debate these issues, but scientists and technologists would be more fruitfully occupied in working out policies which would best serve the interests of our country and our people under the regime imposed by India's accession to GATT.

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NEWS

Report on 'Global analysis, interpretation and modelling (GAIM) science conference'

The global environmental concerns have attracted considerable attention, particularly issues such as climate change, global warming and the ozone hole problem. At the heart of these concerns are the several experimental observations, many theoretical studies and quite a few computer models of global change. An international conference on global data analysis and assessment, modelling of biogeochemical systems and their relationship to physical climate as well as interpretation of current trends in data and modelling could not have been held at a more opportune time.

The recently concluded GAIM Science Conference, organized by the International Geosphere–Biosphere Program, September 25–29, 1995, Garmisch–Partenkirchen, Germany brought together over 300 scientists from 44 countries in a major effort to advance the study of the coupled dynamics of Earth system using both empirical studies and computer models. A significant participation from the developing countries was made possible thanks to the generous funding from the German government and the National Science Foundation, USA. There were about twelve participants from India.

The focus was on biogeochemical cycles, as well as the identification and assessment of natural and anthropogenic changes in the various subsystems of the Earth. The research findings reported covered real-time and proxy or indirect measurements of past and present changes in global systems. These findings also relate to changes in the climate system and its interaction with biological systems such as forests, wetlands, ocean biota and other ecosystems. The sessions were grouped by time periods into four major sections: Paleo (more than 20,000 years before the present, i.e. 20 ky BP), Historical (2 ky BP or so), Contemporary (last few decades) and the Future. A special session on global systems integration addressed the problems of combining the interactions and feedbacks of biogeochemical subsystems into whole-earth models.

Studies of paleo-climate, as inferred from indirect measurements, show that climate change is largely the reaction to forcings such as orbital, solar and volcanic dust with superimposed noise. Several parameters have been identified from paleo data which can be used, in principle, to estimate such forcings. It was reported that quasi-oscillations such as the El Nino–Southern Oscillation and the Monsoons change their character with changing climate, so that new types of variability may develop and play an important role in future climate. It was pointed out that it is necessary to arrive at a quantitative understanding of the North Atlantic mode switches during the glacial and to examine whether under warmer climate, the enhanced water vapour transport to higher latitudes might induce similar changes in deep water formation and distribution of heat over the globe.

Methane, a radiatively active trace gas, is of great significance in understanding past climate conditions. Apart from the recent anthropogenic increase, the most striking feature reported on the methane profiles is the general coherency between the CH_4 and climate changes. The large CH_4 changes observed over the various time scales are thought to result from variations in the hydrological budget over the continents, affecting the extent of wetlands – the main natural source of the gas. The comparison of CH_4 changes, during the last deglaciation and during the Holocene, with the paleo-climatic data

tion and the real role of the universities, the infrastructure the country has developed is advocated to be surrendered to the private sector by the supporters of the new economic policy – which will fuel the crisis in the universities and university science.

The germs of this illness can be traced out in the complex character of our society too in which the university system exists. Universities as centre of learning are expected to bring out society up from its traditional evils but somehow social evils have dominated the university system. The remedy is not easy. But further deterioration will lead to the collapse of the system good or bad we have developed with a definite infrastructure. It needs thorough discussion and participation of each section. Superficial and ill-worked conclusions do not help; rather they will divert the input and energy.

Planning should be drawn to search out motivated people from the masses and not from the elite sections who live in the big cities only for higher education and technical training. General standards of input and output have to be improved countrywide and definite accountability is required to be fixed at each level. Participation of youngsters and people from the distantly placed universities and colleges should also be assured in the decision-making bodies. Most importantly, science education and research should be well linked to the societal and environmental problems of the country.

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Intellectual property rights and biological resources

The article by Madhav Gadgil and Preston Devasia on 'Intellectual property rights and biological resources: Specifying geographical origins and prior knowledge of uses' (*Curr. Sci.*, 1995, **69**, 637–639) has a significant bearing on the debates relating to the Convention on Biological Diversity (CBD) and the General Agreement on Trade and Tariffs (GATT). Some comments:

1. IPR specifications should include not only a declaration of country of origin (or other source) and known indigenous knowledge (as suggested by the authors), but also proof that the material/knowledge has been obtained in keeping with the provisions of the CBD. This would include:
- Prior informed consent of the country of origin (Art. 15 of the CBD);
- Mutual agreement with country of origin (Art. 15); and
- Consent of local community, if any, from where collected (Art. 8j).

I have, in a note to the CBD Conference of Parties, proposed an International Certificate Regime, in which such declarations are made. However, even before such a regime can be established (possibly as a protocol to the Convention), IPR rules can specify such requirements.

2. The authors' definition of 'country of origin' is problematic (it incidentally came up in a similar form and received heated reactions during the negotiating rounds to the CBD), for the following reasons:

- It appears to suggest that the Convention's provisions should act retroactively, to which there is vehement opposition not only from industrial countries but even from many tropical countries which have received genetic resources from other tropical countries (for instance, would India be made to pay for coffee/tea/rubber, or Latin American countries for coffee?);
- It does not match with the CBD's, and amendments at this stage are extremely unlikely;
- Some other system would have to be figured out for resources whose origin is unknown or unclear, or whose origin was in a 'country' the boundaries of which now exclude the region of origin (if something originated in what is now Pakistan, who would be the country of origin: India or Pakistan?);
- What are 'components of natural biological communities'; is a wild plant taken from India and 'naturalized' for over a century in, say, Brazil, such a component? Is *Prosopis juliflora*, or *Lantana camara*, now 'naturalized' in India, such a component?
- In case of domesticated/cultivated components, I can understand that the authors want to exclude countries which have received crops/livestock from other countries in the last five hundred years; but what of varieties which have been developed *within* the last five hundred years? These are not covered by the authors' definition.

It was some of the above reasons which led the negotiating parties in the CBD to the simple definition of countries of origin as those countries which possess the resources *in situ*. By no means is this the ideal definition (especially given that many true countries of origin lose out), but it appears to avoid many of the problems, and is therefore the most acceptable. In the long run, we could consider a less problematic definition, like: 'country where the resource is known to have had its first occurrence, and, in the case of resources for which this is not known, the country where the resource occurs in *in situ* conditions'.

3. There are now several other concrete suggestions for ensuring recognition and returns for local community knowledge, including some form of community intellectual rights, material transfer agreement contracts, and so on. Some of these may be as effective as IPR regimes, and need to be examined worldwide and in India.

4. Finally, I must add that the question of whether IPRs should be allowed on life forms (and biotechnologies) at all is far from resolved; I personally have several ethical and socio-political reservations, and my comments above should not be construed as a fundamental acceptance of such IPRs. Any further debate on the above could perhaps touch on this aspect as well.

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