

## Millennium Development Goals and ICTP

K.R. Sreenivasan  
Director, ICTP

I regret that I wasn't here on the first day of the Retreat and so was not a party to the important discussions that took place. Yet, from the documents received before the meeting, I understood that one of the main questions to be considered was, "How does UNESCO contribute to fulfilling the Millennium Development Goals (MDGs) adopted by the United Nations?" This is an important question. Time is running out on us and it takes many years to set right the wrongs of several centuries. Since our Center, ICTP, is a part of UNESCO, it is appropriate to ask, "How does ICTP contribute to this goal?" and discuss how ICTP fits in the vast network of the UN institutions.

The MDGs address ageless issues of profound consequence --- such as the reduction of extreme poverty, increase in public health, provision of clean drinking water, and so forth. Our Center, on the other hand, has been engaged in research and training at the front end of physics and mathematics --- such as superstrings and supersymmetry, black holes and the big bang, particles and fields, topological and dynamical singularities, electronic assemblages, quantum optics and quantum information, and so forth. Even though we do discuss areas of applied science, we are still on the theoretical end of science. Are we somehow at odds with the MDGs? What can ICTP really contribute to realizing the MDGs --- do we contribute? This is the question I would like to address.

I will start with broad views first and narrow down to specifics soon. Our thinking is this: First, if someone from Madagascar, wants to do research in string theory, say, who am I to say to her "no, that's not for you, it is only for people who work at the Institute for Advanced Study in Princeton?" Every individual wishing to develop competence in any area of physics and mathematics must have a place to turn to --- and that is our Center! If there is no such place like ours within the UN system, we will have failed a number of scientists from developing countries who will have no option but take roots in a developed country for good --- something the world at large agrees should be avoided where possible. Second, if someone does something rigorous at one point in her career, the same level of rigor can be carried through to whatever else one does later: without some level of rigor in one's thinking, we all agree that nothing worthwhile can ever happen! Third, the scientific tools employed in one branch of science are often adapted to another. The imaging techniques employed in the analysis of Cosmic Microwave Background Radiation --- this is the remnant of the electromagnetic radiation coming from the early days of the origin of the Universe --- are the same as those needed to map out the natural resources in the forests of Uganda. The frontier knowledge of information sciences is immediately useful to farmers in Bangladesh. Fourth, our Center has always hoped --- and indeed expected --- that some of the scientists trained here will apply their knowledge to problems that are pressing in their countries and their contexts. This is not wishful thinking: some of our associates have indeed created new centers in their countries, often with ICTP's help, for generating scientific capacity.

At a more specific level, the following remarks may be appropriate. Though our Center has emphasized advanced physics and mathematics for its research appointments, it has always held training programs in areas directly related to sustainable development: for example, we are just holding the 21st College on Soil Physics --- to which pretty much every soil scientist in the world has come at some point or another; we have held programs on renewable energy, climate change, earthquakes, plasma physics, microfluidics, even the modeling of how infectious diseases spread. We are soon holding a workshop on biodiversity and coastal upwelling. We are able to do so by involving a large number of experts in these areas, culled from all parts of the world. Many of our scientific visitors indeed work in areas in which no long-term expertise resides within the Center.

At a more important level in the present context, we have indeed realized that our Center has to evolve --- and evolved it has! For instance, my predecessor set up a small group of people working on climate changes, especially regional climate modeling. Since I arrived, I have coalesced this activity with a number of other minor activities of ICTP (such as earthquakes, soil physics) to form a full-fledged scientific section called Earth Systems Physics. The emphasis is to build the scientific capacity of people who have a systems approach to planet Earth, on how to develop its resources while keeping sustainability in mind. We recognize that sustainable development is perhaps the most urgent challenge that can be posed to scientists of our times. The arguments I have used with our scientists in promoting this section are the following:

In the era between the 1940s and the 1980s, physics was driven, to a first order, by concerns of national defense in major industrial countries: think of atomic weapons, aero and missile dynamics, Star Wars, and so forth. This era conferred upon physics an aura of mystery around it, and, again to the first order, most work was done in a small number of countries.

Today, on the other hand, a major issue (perhaps the most important issue) that determines the future of humanity is sustainable development (by which is meant the management of Earth's resources without depleting them for good). If we don't pay attention to it, if we don't develop the scientific and quantitative basis to address these problems, we will have become irrelevant and shirked our responsibility.

Our operating principle at the Centre, then, is to emphasize sustainable development issues without, however, de-emphasizing other areas of physics and mathematics in which our Center has been working --- exactly for reasons I have mentioned earlier in my remarks.

Progress has been slow at ICTP in meeting the challenges posed by sustainable development. It has been slow because: traditions are hard to change and practical visionaries are hard to come by; many in UNESCO headquarters, as well as other UNESCO scientific institutions, do not realize our interest and expertise in these areas and do not treat ICTP as a resource; while our presence is already felt in some sub-areas such as earthquakes and climate changes, it does take time for the full impact to be felt;

and problems are immense while the resources are limited.

I will close with two questions and possible answers:

(1) How should you view our Center?

Our Centre can't attain MDGs single-handedly any more than a small number of scientists anywhere can. These problems are too big even for UNESCO as a whole, perhaps for any organization in the world. But our Center should --- and will --- take serious responsibilities for developing the human capital that is needed to address the MDGs. This is what the Centre is about.

You should thus treat ICTP as a resource to which to turn, or involve as your partner, in your efforts. I would like to stress that our Center has many connections with practising scientists whom you will find useful.

(2) My second question is: what can we do to increase UNESCO's effectiveness in this regard? My first observation concerns the culture within UNESCO, indeed within the UN system. UNESCO thinks about big problems --- indeed grand problems --- affecting us all but without breaking them down to smaller problems with assigned responsibilities, and financial and human resources needed to address them. If UNESCO has to be an important instrument in realizing Millennium Development Goals, among other things, it needs to put more resources into science. It has to be made clear to the UN at large, and to member states in particular, that the science sector in UNESCO needs increasing support and not remain on the sidelines with shrinking budget. Our scientific officials in UNESCO, such as Walter Erdelen, need our support in generating innovative projects and in articulating the arguments.

In the same way, if ICTP has to be involved deeply and more directly in MDG, we need additional resources which we can use especially towards these issues. Otherwise, we will indeed be limited, though, as already pointed out, we do make a difference. Our new section on Earth System Physics is a strong indication of our Center's commitment to sustained development and to the realization of the Millennium Development Goals. We know that the planet either survives as a hospitable place for us all, or for none.