

A perspective on the migration of scientists

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29 June 2006

It is estimated that about 2.5% of the world's population is presently in the process of migrating to a new country---some of it legally, some of it otherwise. The large numbers involved create enormous strain on civil society as we know it, in both donor and host countries. Within the population that is seeking to migrate, scientists are but a miniscule fraction. In Italy, it is estimated that only 2% of the roughly 2.5 million immigrants are scientists. For the US, it is estimated that about 50,000 of the million or so immigrants every year have some technical expertise. An even smaller number of them can be labeled as scientists.

Despite the small size of the scientific community, its migration has wide impact on education, scientific culture, technological development, and national morale. To emphasize my point, allow me to recall the following facts:

The migration of scientists from Europe to the U.S. during and immediately after the Nazi era shifted the center of gravity of science from Europe to the US. The process involved relatively few people, but the impact on science and on university education has been immense for both Europe and the US. The technical superiority that the US acquired during these years continues even now---one might say, because of its sustained policy (with occasional deviations) of embracing immigrant scientists. For example, three of the four US Nobel Prize winners in 1999 were first-generation immigrants.

Conversely, after the '70s a large number of scientists from developing countries moved, and are still moving, to the US and Europe. This migration is regarded as "brain drain" on the whole, constantly eroding the scientific capacity of the developing world.

After the '90s, a rapid migration of scientists occurred from the former Soviet Union to Europe and to the US. It is estimated that some 200,000 scientists have moved away, essentially decimating the once-thriving centers of excellence in USSR, causing an estimated annual loss of 50 billion dollars.

It is perhaps appropriate to recall the remark attributed to the 17th century French scientist, Blaise Pascal (1623-1662), that France would become an idiot nation if some 300 of its scientists left the country.

Altogether, therefore, the issue of migration of scientists deserves special attention. This is what I propose to discuss here.

I should immediately note that my discussion will lean heavily on the experience acquired through the lens of my own institution, the Abdus Salam International Centre for Theoretical Physics in Trieste---or ICTP, as it is universally known. Thus, to make sense of much of what I shall say, it is useful to recall schematically the history of the Centre and the way it functions. Please bear with me.

Abdus Salam, born in British India, graduated with a physics Ph.D. from Cambridge and returned to his new country, Pakistan, as a professor. In the couple of years that he spent there, he felt miserable because he could do no competitive physics: there were no peers with whom to discuss, no library facilities from which to learn, and the teaching load was heavy. He went back to Cambridge, and later to the Imperial College of London.

But Salam felt deeply that, had he been given the opportunity to be part of a center of excellence where he could interact with the best scientists from all over the world, a center which would provide him a periodical haven for doing front-ranking research, he would probably have stayed in Pakistan and built the scientific capacity of that country more directly. He went about creating a center of just that sort.

Salam advocated for an international center, focused on physical and mathematical sciences, sometime early in the 1960's. It was the time when the world was divided into two cold war camps separated by the iron curtain. The city of Trieste, which lies at the threshold between eastern and western blocks of yesteryears, had been returned to Italy only a few years before. Salam's idea caught the attention of some Trieste physicists, mainly Paolo Budinich, who were devoted to the idea of making Trieste a center for a continual exchange of scientific ideas between the East and the West. These two interests merged and ICTP came into being. It is now organized under a special tripartite agreement among two UN organizations, namely UNESCO and IAEA, and the Government of Italy.

TWO FIGURES HERE DESCRIBING ICTP

Let me recall the philosophy of the Centre before getting to its impact on immigration issues. The Centre has always felt that it is important for developing countries to keep their scientists engaged in research and education in their own countries. It has further felt that this can be achieved in part by providing scientists from developing countries a certain level of mobility (or "circulation") which allows them periodically to meet good scientists from other countries, exchange ideas, and create new ones by learning from each other. Almost every program that the Centre has invented over time has kept this spirit in mind. For this reason, I shall not discuss issues relating to scientists (like myself) who do end up migrating, and problems that they have to face. I shall not discuss, in particular, the conditions which make one country more desirable than another as a migration target for scientists. Such conditions are, in many respects, not very different from those faced broadly by the immigration population.

In recent years, the Centre has had to adapt itself to three major world events. I cite them primarily as symptomatic of the sorts of global issues that affect the mobility of scientists from even the smallest nations. The first is the fall of the Soviet empire. This event reduced the importance of the Center as a principal contact point between the two cold-war blocks. ICTP adapted itself by treating Russia like any other scientifically developed country (including hiring some Russian scientists on its staff), and by treating most former countries of USSR from Central Asia and the Caucuses as developing countries in need of support. It developed further ties with East European countries like Slovenia, Ukraine and Belarus. The collapse of the former Soviet Union increased the Center's responsibility in another way. Scientists from former client states such as Cuba ended up having no place to go but ICTP.

Then came globalization. We shall take the word to mean free trade, free flow of capital and free access to ideas. Globalization is a controversial notion because even those who espouse the virtues of free migration of goods and capital do not necessarily support the free migration of people. This view, which is not to be interpreted as anti-immigrant but rather as anti-immigration, is motivated by concerns that free migration of people leaves in its wake much more intense problems than does the free flow of goods and capital. The scientific scene at ICTP has followed the trends of globalization in some respects.

To understand this last statement better and to see how our Centre has adapted itself, we should make a bit of digression.

The Centre has always encouraged the mobility of scientists and their free movement for purposes of building connections and common projects, but has discouraged the permanent dislocation of scientists from developing countries to the richer ones. Permanent migration was thought to result in a one-sided loss to poor countries. But thoughtful people now agree that depriving scientific capacity for any part of the world may result in a loss to all its parts, as poor decisions made in one part of the world inevitably affect every other part. This situation is truer now than before, for two reasons: first, the world is connected more than ever, and, second, our planet is under such pressures where poor decisions may lead to irreversible exhaustion of its resources. Such prospects include climate changes, the depletion of fisheries, minerals and water resources.

The prospect of development in a sustainable context will only underline the need to enhance scientific capacity in all parts of the world, and reinforce the importance of the Centre's functions. In the long run, large-scale depletion of scientific capacity in any part of the world is detrimental to all its parts. In this sense, ICTP's vision has been both pioneering and far-reaching.

It thus appears natural to conclude the following: whatever the merits or demerits of wholesale transfer of goods and capital, it is not beneficial, as a rule, for wholesale immigration of scientific communities to occur from developing countries to rich ones. It is important, however, to have a free and continual mobility of scientists for short periods

of time, crossing national boundaries periodically and developing international groups within which they become equal partners. This is precisely what ICTP attempts to do.

The most spectacular example of the benefits of mobility of scientists is modern China. After the concerted migration of Chinese scientists to the U.S. in the 80's and early 90's, many returned to China and drastically altered the scientific and technical landscape of their country, and started creating new wealth. This kind of mobility makes the concept of "brain drain" less meaningful. Regretfully, however, the situation is less sanguine for some other countries, especially in the sub-Saharan Africa. For those countries, the mobility of scientists has made the risk of losing the best and the brightest even more real. For a variety of reasons, globalization has made some countries winners but tougher for others. Recall that in the cold war days a large number of students from developing countries studied in the USSR and returned home. Indeed, in several African Universities, there are many scientists even today who were educated in the USSR. This kind of opportunity has diminished overall in recent years, as we shall see below.

The third world-event of some significance for the mobility of scientists is the terrorist attack on Twin Towers on September 11, 2001. Its policy aftermaths are too well known for us to discuss here. The repercussions are felt even at ICTP. These effects have impacted the core reason for the success of ICTP, namely the mobility of scientists. This mobility is hindered because the vigilance required to keep terrorists at bay is often extended to scientists as well. Italy has been exceedingly generous in balancing these two conflicting requirements, but it has become a constant struggle to get scientists to come to ICTP on time to attend scientific programs. In particular, it has been difficult to get visas for scientists from certain countries in the Middle East and South Asia.

I have argued above that building certain level of scientific capacity in all parts of the world favors our common good. Unfortunately, it has become increasingly acceptable these days to think that some countries misuse their scientific knowledge and must therefore be shut out. On the other hand, ICTP builds scientific capacity with the expectation that it will feed into proficient public policies benefiting all of society. This is positive thing to do. In particular, ICTP is not in the business of technology transfer which is a somewhat more controversial issue. We must, however, acknowledge that a tyrant can indeed get hold of a potentially destructive technology and abuse it. Part of the solution is that, even as we advocate scientific development, we must also promote ethical values, civil society and respect for human rights and dignity.

It is sometimes claimed that the world today is divided today along religious lines more than at any time in recent memory. This is a dramatic statement but there may be some truth to it. At ICTP, we have been doing our best to support good scientists from all parts of the world, independent of their ethnicity, culture or religion. We look for scientific competence within the broad mandate of encouraging diversity. To do justice to both diversity and excellence is demandingly difficult, but that has been the mandate of the Centre, and one which is worth working for. The following two slides illustrate my point.

TWO FIGURES HERE DISPLAYING THE DIVERSITY OF SCIENTISTS WHO VISIT ICTP

There is fourth and final point I wish to make. The world has witnessed a true revolution in ITC, or information and telecommunication technologies, and it is only natural that we should use ITC more and more effectively to supplement the physical mobility of scientists. But the promise of these technologies has been limited in developing countries for what is known as the “digital divide”. The figure shows the speed of internet connectivity in different parts of the world.

ONE FIGURE HERE SHOWING THE SPEED OF INTERNET IN DIFFERENT CONTINENTS, SHOWING IN PARTICULAR THAT THE SPEED IS A FEW HUNDRED TIMES SLOWER IN AFRICA THAN IN THE US, DESCRIBING HOW HARD IT IS TO DO COMPETITIVE SCIENCE UNDER SUCH CONDITIONS

Even if the speed of the internet in developing countries can be enhanced significantly, there is almost nothing that can supplant personal meetings when it comes to matters of science. What is required is a judicious combination of the mobility of scientists, the use of ITC to hasten the building of scientific capacity all over the world, keeping matters of sustainable development on the front burner. This is our task as I see it. It is a task that requires enlightened policies of governments (for instance, they often control the bandwidth costs), infusion of significant capital (for example, by providing satellite time and fiber-optic networks) and, of course, a certain level of commitment and faith in the value of the endeavor.

In summary, there are at least two separate issues relating to the migration of scientists. The first set of questions relate to what makes migration possible and desirable, and how to protect the migrant rights and their adaptation in a new country. The second set of issues concern the stemming of the tide of immigration of scientists from developing countries to the developed. I have limited my discussion to the latter because of their importance and urgency. Without a decent level of scientific capacity in every country, the danger that policy decisions are made in a knowledge-vacuum is real, and that such decisions, even if made locally, can affect the future of humanity globally due to the enormously enhanced connectivity of the world populations.

There are many requirements for keeping a scientist gainfully engaged in his work in his own country. Ignoring personal circumstances, it appears to me, from a number of conversations with individual scientists, that they would be content to work in their own countries if the following conditions were broadly met at a reasonable level of satisfaction:

- Possibility to do some interesting scientific work;
- Long term commitment for science by the governments;
- A career path where decent advancement is possible without political interference;

- A certain level of international mobility or circulation not only to avoid isolation but also to become full-fledged members of international groups.

ICTP works directly, and in diverse ways, the last of the above four items. It is constantly engaged in urging scientific establishments in developing countries to make the first three possible. The success has often been a matter of chance rather than the result of a considered strategy.

I wish to conclude with the following comment: ICTP has been in existence for 42 years. Over these years, Italy has been its steadfast sponsor. I believe that this has been possible because Italian governments of all shades have generally understood the importance of the ideals represented by ICTP, and have informally concurred that the mobility of scientists, not their permanent migration, is the key to building scientific capacity. I wish to publicly express my appreciation for this enlightened approach, and gratitude for the support. Immigration is an incidental issue to our Centre but I hope that the lessons learned are of broader value. I have tried to outline some of these aspects.

Thank you.