

WILL SCIENCE BLOSSOM IN THE ARAB SPRING?

SCIENCE COULD BE BOTH A SOURCE AND BENEFICIARY OF THE DRAMATIC CHANGES TAKING PLACE IN THE ARAB REGION BUT ONLY IF THE MOVEMENT STAYS TRUE TO ITS ABIDING PRINCIPLES OF DEMOCRACY AND TRANSPARENCY.

The Arab region is comprised of 22 countries and is home to 350 million people. Some 30% of the population is less than 15 years old. East to west, the region stretches from the Indian to the Atlantic oceans; north to south, from the Mediterranean to the Arabian seas. People in the region share a common language, religion and history. Yet there are also significant differences in governance, socio-economic systems and wealth.

When it comes to science, technology and innovation, the prevailing notion has been that Arab countries continue to lag substantially behind other regions, not only in the developed world but increasingly in the developing world as well. Yet, there is also a sense that the region's scientific and technological capacity

has grown in recent years, although not as fast as proponents would like and more rapidly in some countries than in others.

Even more importantly, the advances in science and technology that have taken place have not always translated into improved living conditions for the people in the region. Social conditions are difficult and good paying and rewarding jobs are hard to find, even for those who are well educated. Unemployment in the region exceeds 10%. For people under 25, it is estimated to be 30%.

The 'Arab Spring', which began last December, has upended many of the conventional assumptions about the region and has made it virtually impossible to predict what the future will hold for science and



society. Indeed the Arab Spring has exposed just how tenuous discussions about the future of the region can be in light of the unforeseen events that are now taking place virtually everyday.

The events that have followed the Arab Spring have also revealed how difficult it is to view the region as one – despite its shared heritage

and the common set of challenges that it faces. In fact, it is distinctly possible that the sweeping changes currently unfolding across the region will play out in different ways in different countries – again for both science and society.

This much we know: Prior to the Arab Spring, a growing number of countries in the region were taking significant steps to improve their scientific capacity. We witnessed this trend in such dramatic, high-profile initiatives as the launching of the King Abdul-Aziz University for Science and Technology (KAUST) in Saudi Arabia, Education City in Qatar, and Masdar City in Abu Dhabi. Each is a multibillion, multi-year project carrying lofty ambitions that correspond to the projects' price tags.

We also witnessed this trend in the extensive investments that the Qatar Foundation, the Mohammed bin Rashid Al Maktoum Foundation and others have made in science and technology, and in the partnerships they forged with other scientific institutions, including prominent universities in the United States and Europe. And we witnessed this trend in the commitments that govern-



ments have made to increasing the percentage of their national gross domestic products (GDP) devoted to research and development (R&D).

Many Arab countries spoke of putting science and technology to work to solve the region's pressing problems in agriculture, water and energy. For example, in 2010 Morocco pledged to increase the share of energy produced from renewable sources from 4% to 12% by 2012, and the Moroccan National Electricity Office announced plans to invest more than USD3 million on projects designed to meet this target. Countries throughout the region have emphasized the importance of investing in such cutting-edge technologies as information and communications technology, nanotechnology and biotechnology. Egypt, for example, opened up a nanotechnology research centre in 2009 in the government-sponsored "Smart City" just outside of Cairo.

Many of these initiatives will undoubtedly continue in the

aftermath of the dramatic events that have taken place this year. Indeed such initiatives might even be expanded.

Saudi Arabia, Qatar and the UAE, for example, have continued to move ahead with their plans to build world-class educational and research facilities on a grand scale. Equally important, the provisional post-Mubarak government in Egypt announced that it would increase spending on science and technology by one-third from USD66.5 million in 2010 to USD90 million in 2011. It also announced that it would spearhead a drive to build a USD2 billion science city named after the Egyptian-born Nobel Laureate Ahmed Zewail (TWAS Fellow 1989).

Yet, we also know that these efforts are set against a backdrop of significant shortcomings and challenges.

For example, the region on average spends just 0.38% of its GDP on R&D compared to a global average of 1.7%. Similarly, the





region has just 407 researchers per one million population, compared to a global average of 1,544.

With the uncertainties and disruptions caused by the political and social changes now taking place, it is not at all clear that countries within the region will be able to maintain the investments in R&D that they have made. This is especially true in Syria, Yemen and other countries where widespread political unrest, government suppression and violence persist.

The prospects for continuing – and indeed increasing – investments in science and technology are not the only challenge. In 2008, scientists in the region published 13,574 articles in peer-reviewed international journals. That represented nearly twice as many articles as in 2000. Yet, in terms of scientific articles per million population, the Arab region publishes 41 scientific articles compared to a global average of 147. Only one Arab scientist, Boudjema Samraoui, a biologist at the University of Annaba in Algeria, is included in

the list of the world's most cited scientists compiled by Thomas Reuters (formerly ISI) *Web of Knowledge*.

In 2008, the number of patents that technologists and entrepreneurs in the region filed in international patent offices totalled just 71, compared to a remarkable 84,110 in South Korea, a country whose scientific capacity was comparable to Egypt's in the 1960s. In a similar vein, only Cairo University makes the list of the 500 top universities published by Shanghai Jiao Tong University in China. And only seven of the 22 countries in the Arab region host national science academies.

In short, the progress that the Arab region has made in strengthening its scientific and technological capacity rests on a weak foundation and, given the tumultuous events that have taken place within the region over the past six months, there is no guarantee that these advances will continue.

Yet, there is reason for hope. Science, after all, depends not just

on the level of financial investments but also on the health of the social and political environment in which it is taking place.

Evidence-based inquiry, transparency and excellence are the hallmarks of international science. Moreover, science itself seems to function best in countries that embrace these principles in spheres of concern other than science, most notably governance.

That is why the Arab Spring holds such great promise for both science and society. If the democratic impulses that drove the protests in the first place can guide the principles of reform that are now taking shape, science will surely benefit. Successful societies built upon abiding respect for evidence and excellence are also societies in which science flourishes. Indeed societal and scientific progress seems to go hand-in-hand in a virtuous cycle of success.

The challenges for the Arab region are two-fold. First, countries throughout the region must devise effective strategies for getting from

here to there, and must do so as quickly as possible. Calling on people to be patient in the face of the dramatic changes that are taking place is one thing. Expecting them to be patient is quite another, especially if the economy stalls and conditions do not improve – or, even more troubling, deteriorate.

The history of the Arab region since the late 1940s has been one of disappointment and disillusion-



ment. The material well-being of citizens throughout the region has often been neglected and their very identity as a people placed under assault – both by outside forces and the policies of their own governments. The inability to settle the Palestinian-Israeli conflict has served as a flashpoint of anger and resentment. The stalemate has had grave repercussions for the Arab region and the entire world.

Not surprisingly, scientific communities throughout the region have not been shielded from the consequences. The failure to achieve peace in Palestine is undoubtedly a major reason for Arab frustration

today. The sense of hopelessness prompted by this never-ending conflict has evolved into chronic public discontent and spasms of violence. The conflict must be resolved if the Arab Spring is to succeed.

Such a resolution would have a positive impact on both science and society.

Here's why. The Palestinian-Israeli conflict led governments throughout the Arab region to define security in the narrowest of terms, not only because of the threat posed by Israel but also because of the uneasiness fuelled by the discontent of their own people.

Given a choice between national security and democracy, governments opted for security, which in their minds also meant not only protecting their borders from external risks but also ensuring social order within the borders.

For the scientific community, such governance meant that their activities would be funded to a degree but only within an environment of oversight and control that would stymie the scope and impact of national research agendas.

This sentiment was shared by the region's outside benefactors, most notably the United States and Europe, which continued to assist the governments of Arab countries in the name of social order even if it meant turning a blind eye to



government-led violations of freedom and human rights.

As a result, Arab governments have spent an inordinate percentage of their budgets on security. Over the past quarter century, the percentage of government expenditures devoted to national defence averaged 4% throughout the region, and this does not include the amount of money devoted to internal security.

Money spent on national defence and internal security cannot be spent on other critical issues. And that is why it is critical for governments to broaden the scope of security to include such matters as water, food and energy security.

Indeed, it would be wise for the governments throughout the region



to embrace the five key areas for sustainable development first outlined by former UN Secretary General Kofi Annan at the World Summit for Sustainable Development (WSSD) in Johannesburg in 2002: water, energy, health, agriculture and biodiversity, which have since been referred to under the acronym WEHAB.

Security, in short, is not simply matter of protecting the population from enemies, however vital to national well-being this is. It also includes protecting the population from material want and ensuring that people have access to the basic building blocks needed to construct a life defined by well-being and opportunity.

Second, it is important for Arab countries to provide not just token, make-work jobs but to create clear pathways to rewarding and fulfilling careers for their increasingly educated populations. It was not just material deprivation that led to the

Arab Spring. Rather, it was a gnawing sense of hope unfulfilled – and never to be fulfilled – that prompted the people to confront their governments and not back down.

Just as the region’s rapid population growth over the past several decades has placed the region’s ecosystems at risk, it has also created an expanding pool of a frustrated young workers unable to find jobs that match their levels

sufficient to ensure that they are satisfied with the changes that are taking place. Events over the past six months suggest that the opposite may be true: that well-educated citizens denied opportunities pose a greater threat to the existing social order than do marginalized and poorly educated citizens harbouring scant hope for change. For the government, this reality means that they must devise strategies that are



of education or their desires for success.

For example, both Egypt and Tunisia have increased enrolment in universities by 35% over the past 20 years. However, neither country was able to provide job opportunities commensurate with their youthful population’s education and skills. This created a huge reserve of unemployed young people who joined – indeed led – the uprisings that marked the Arab Spring.

Yet, providing increasing numbers of young Arabs with educational opportunities, however noteworthy and valuable, will simply not be

attuned to the demands of the global economy, which has become the hallmark of the 21st century.

Key goals for the government must not only include providing a good education but also helping to generate a sufficient number of good jobs for all citizens and especially college-educated citizens whose expectations have been raised by the education they have received.

For the scientific community – and more generally universities and research centres – a key goal must be to provide training that helps to make students “worker-ready”. Such a strategy will require



universities and research centres to collaborate more closely with both government and the private sector and to provide training for their students that conforms to the knowledge and skills that employers desire.

History dating back more than 1,000 years shows that scientists

from the Islamic world first measured the circumference of the Earth, first mapped the constellations of the stars, and first laid out the basic tenets of the scientific method based on observation, measurement and verifiable proof.

The Golden Age of Islamic science spanned more than 1,000 years from 7th to the late 16th centuries, when the ruling sultan closed the Istanbul observatory. It drew its strength from such centres of learning as the Library of Alexandria and al-Ma'mun's House of Wisdom in Baghdad, and its inspiration from such science luminaries as al-Khawarizmi and Abu Ali ibn Sina. It went on to produce an outpouring of knowledge unmatched in world history to that point. It is a past worthy of praise and celebration.

But the only way to return to the glories of the past is to successfully chart a path to the future that accepts the world as it is in the 21st century and not like it was in the 11th century.

The Arab Spring has given the region the opportunity to do just that. Whether the region takes full advantage of this opportunity will be determined by decisions made by the people and their governments both now and in the years ahead.

The scientific community has a key role to play in this effort. Few other sectors of society will benefit more from reforms dedicated to transparency and excellence, and few other sectors will be able to contribute more to efforts to build more peaceful and prosperous nations.

There is no question that science can benefit from the Arab Spring. But that will only be the case if the Arab Spring fulfils its promise to transform society in ways that past regimes did not. ■

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