

# BAI CHUNLI: A FUTURE VISION FOR TWAS

EARLY IN HIS TERM, THE NEW TWAS PRESIDENT DETAILS  
THE ACADEMY'S ROLE IN PROMOTING SCIENCE FOR SUSTAINABILITY  
IN A CHANGING WORLD.

**A**s the new president of TWAS, I am writing to share with you my “food for thought” about the future of the Academy. I take up this position at a time when the world is facing unprecedented challenges, the developing world in particular, and this requires bold steps and innovative solutions. TWAS must stand ready to support governments and peoples of the developing world to find science-based alternatives to support economic development and global sustainability.



excellence of science and scientific capacity-building in the developing world. Thanks to the financial support from the government of Italy and other developed countries and the political support of the United Nations, TWAS was founded in 1983 in Trieste, Italy, and officially launched soon after.

In the years leading up to its 30th anniversary, TWAS has achieved remarkable progress and success. It has increased its membership dramatically, from a few dozen to more than 1,000 worldwide now; it has launched various awards, grants, fellowships and regional initiatives for capacity-building and the training of young scientists of the developing world.

Among various milestone achievements and developments it has made, I want to particularly highlight those achieved in 2003 and 2004. In 2004, the Italian parliament passed a law ensuring “permanent funding” for the operation of the Academy. A year earlier

## 1. PAST EFFORTS HAVE ALREADY LAID A SOLID FOUNDATION

Abdus Salam and his supporters started the idea of building an “association of scientists” for the developing world even before the end of the Cold War. This far-sighted initiative laid the foundation for the establishment of an academy in which scientists from the South could contribute in a collective manner to the



saw the establishment of the Academy's five regional offices. And no less importantly, TWAS held its 14th General Meeting in Beijing in 2003 in which a 'Beijing Declaration' was endorsed, calling for the further expansion of TWAS as the "voice of science in the South". The Beijing meeting resulted in changing the name of the organization from the 'Third World Academy of Sciences' to 'TWAS, the academy of sciences for the developing world' in the

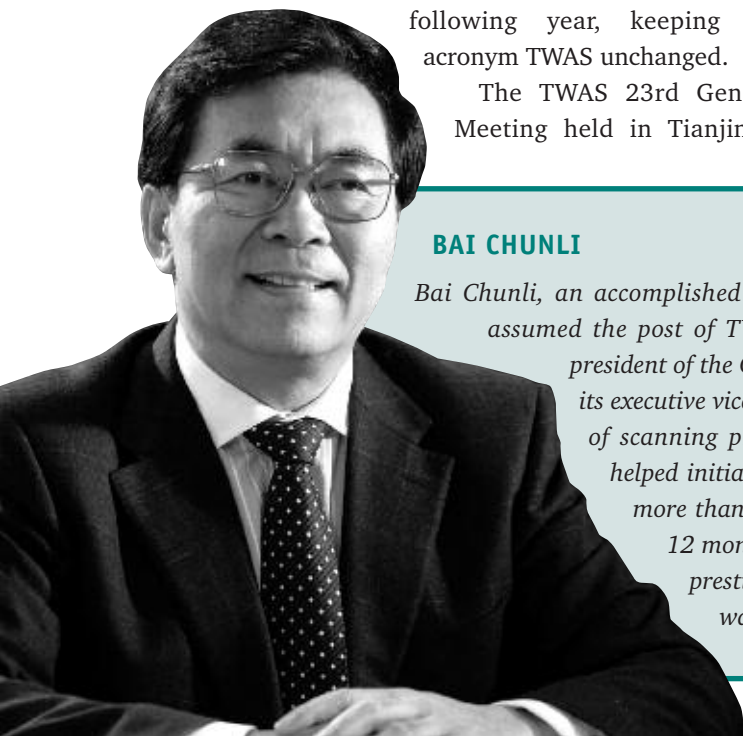
following year, keeping the acronym TWAS unchanged.

The TWAS 23rd General Meeting held in Tianjin in

2012 was another milestone success. Chinese president Hu Jintao attended and made an important speech, encouraging the developing world to further develop their science and technology (S&T) capability and to join hands with the developed world to address various urgent challenges they face. An important consensus reached at the TWAS General Meeting in Tianjin was to change the Academy's name to 'The World Academy of Sciences, for the

advancement of science in developing countries'. This name surely reflects the strong interests and urgent call of the TWAS community to count on all the possible science merits and resources from both the South

***TWAS should shoulder more responsibility in providing some practical solutions to global challenges.***



### **BAI CHUNLI**

*Bai Chunli, an accomplished and influential scholar in chemistry and nanotechnology, assumed the post of TWAS president on 1 January 2013. He also has served as president of the Chinese Academy of Sciences since 2011, after having served as its executive vice-president for about eight years. Bai is one of China's pioneers of scanning probe microscopy, nanoscience and nanotechnology, and he helped initiate and coordinate a range of key projects in this field. He has more than 350 scientific publications in refereed journals and authored 12 monographs and several book chapters. He has won more than 20 prestigious awards and prizes for his academic achievements. He was elected a TWAS Fellow in 1997.*





and North to advance the TWAS mandates for the developing world and for global sustainability.

It has indeed been a paramount success for TWAS to have evolved from an association of scientists in the South to the voice of science of the developing world, to The World Academy of Sciences. With the name change, TWAS will be an academy that will get wider support across the world in advancing its mandates. I must thank all of those individuals who have made what TWAS is today, in particular, the founder, Abdus Salam, Nobel laureate of Pakistan; his successors, José I. Vargas, C.N.R. Rao and Jacob Palis; and the long-term executive director, Mohamed H.A. Hassan. I would also like to thank the government of Italy and many others both in the North and South, and the United Nations system, UNESCO in particular, for their sustained and increasing support to TWAS. Without that joint support and dedication of many individuals, TWAS would not have been able to advance to its current level, ready to meet the increasing demands of developing countries, in pursuit of advancement of science and sustainable development goals. The rapidly changing world presents TWAS both unparalleled challenges and great opportunities.

## **2. TWAS IS AT THE DAWN OF A PARADIGM SHIFT TO MEET UNPRECEDENTED AND INCREASING NEEDS OF DEVELOPING COUNTRIES**

Our world faces many unprecedented challenges such as poverty, hunger, climate change, biodiversity loss and environmental pollution. There are 1.2 billion

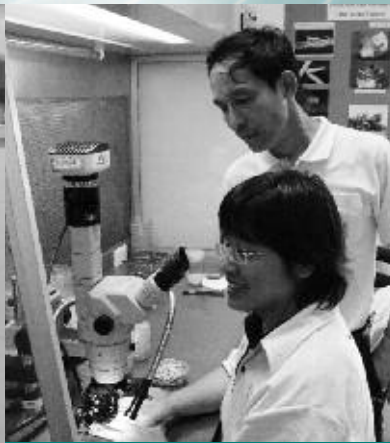
people still living on less than a dollar a day, 1 billion lacking access to safe drinking water, 1.5 billion having no access to electricity and 2 billion facing food insecurity – including 300 million children who go to bed hungry every night!

The population-carrying capacity of the Earth's ecosystem has exceeded its thresholds in many dimensions, including aspects such as climate, biodiversity, cycling of nitrogen and phosphorous (J. Rockström *et al.*, 2009). It is projected that our Earth will have to welcome an additional 700 million people in the next 10 years and witness 1 billion becoming new middle-class consumers with global economic growth increasing by 50% (N. Ishii, 2012).

To address these challenges, we must rely on innovative actions and find various alternatives. TWAS, composed of some of the best minds in the developing world, should shoulder more responsibility in identifying various alternatives and providing some practical solutions.

### **2.1 The pull – Rio+20 called for “enhanced collaboration with scientific and technological communities in the developing world”**

Confronting these challenges, the world leaders at the World Summit on Sustainable Development (Rio+20) in 2012 produced the report *The Future We Want*, stating their “commitment to sustainable development, and to ensure the promotion of economically, socially and environmentally sustainable future for our planet and for present and future generations.”



Of particular importance, the world leaders recognized “the important contribution of the scientific and technological community to sustainable development”. They also recognized the importance of collaboration among academic, scientific and technological communities in developing countries to close the technological gap between developing and developed countries, and the importance of strengthening the science-policy interface and fostering international research collaboration on sustainable development (paragraph 48, *The Future We Want*).

Of the 283 paragraphs in *The Future We Want*, a big portion of them focuses on science and technology and their various contributions to sustainable development such as green economy, institutional framework, the environmental pillar, capacity-building and technology transfer, placing significant importance on science and technology for global sustainability. The TWAS community should actively respond.

“Strengthening science and policy interface” has been most topical in the discussions of the post Rio+20 institutional framework (paragraphs 76, 85, 88). TWAS



***TWAS is positioned to help strengthen scientific cooperation.***

has every reason to contribute to this important process and help science-based policy setting for sustainable development of developing countries.

The Rio+20 declaration also called for “the strengthening of technical and scientific cooperation, including North-South, South-South and triangular cooperation” (paragraph 277) and encouraged “the participation and representation of men and women scientists and researchers from developing and developed countries” (paragraph 279). TWAS is also in the best position to contribute to this call.





***TWAS must adapt itself to the changing world science landscape to meet the increasing needs of developing countries.***

## **2.2 The push – the rapidly changing landscape of world science**

With the role of science and technology in support of the global economy being increasingly acknowledged worldwide, the world scientific landscape has experienced a rapid change. This landscape has not only seen the rise of major emerging economies such as China, India, Brazil and South Africa, but also the taking off of science in many other countries such as Turkey and Tunisia.

The *UNESCO Science Report 2010*, the Royal Society report titled *Knowledge, Networks and Nations: Global*

*Scientific Collaboration in the 21st Century* in 2011, and the United States National Science Board's *Science and Engineering Indicators 2012* all provide clear statistics on this progress as measured by the increasing share of gross expenditure of research and development (GERD) and the increased number of researchers and publications from developing countries. Developing countries contributed more than 30% of world publications in 2008, 26.9% of world R&D expenditure and 35.5% of world researchers in 2009 (statistics from UNESCO website).

Should this trend continue in the next 20 years, there must be dramatic changes in terms of the role of scientists from the South both in their respective countries

and in the whole world. In spite of the big change in the world scientific landscape, it should be noted that science progress is very much unevenly distributed. Huge disparities in scientific capacity exist not only between the North and South, but also within the South itself. Africa, for example, only accounts for 0.7% of the world total R&D performance (*US Science and Engineering Indicators 2012*). Nevertheless, the general enhanced capacity-building in the South and



the developing world's increasing contributions to global science have created a much better enabling environment for TWAS to execute its mission to advance the science agenda and promote further capacity-building. This progress has further paved the way for TWAS to respond to the urgent needs of developing countries in the pursuit of sustainable development goals. TWAS has more capacity than ever before to contribute to the advancement of the global science and development agenda with the backing of the emerging economies.

Of course, in delivering various services, TWAS needs to cooperate with other important players in the world science landscape, such as the International Council for Science (ICSU); the United Nations Educational, Scientific and Cultural Organization (UNESCO); IAP, the global network of science academies; the Inter-Academy Council (IAC); the Commission on Science and Technology for Sustainable Development in the South (COMSATS); and the developed nations.

### 3. DEFINING THE NICHE OF TWAS

As analysed above, TWAS can expect to contribute much more than it is currently doing. TWAS members are all excellent scientists, many of them world-renowned. They are in the best position to influence government policy in their respective countries. This great potential has yet to be further tapped to: help shape the global science agenda; help define science-based development pathways; and help mobilize resources worldwide to increase the capacity-building

of science in the least developed countries (LDCs) and science-lagging countries.

TWAS must adapt itself to the changing world science landscape to meet the increasing needs of developing countries in science and science-based development.

Looking ahead, TWAS may define its niche as follows: A world-leading academic institution that plays an important role in shaping the science agenda, in promoting science for sustainability, and in facilitating capacity-building in developing countries.

The comparative advantage of TWAS lies not only in its more than 1,000 members in different countries and scientific disciplines, but also in their ability and potential to influence science policy and development pathways in developing countries on science, technology and development. The main clients of TWAS include the science community; ministers of science and technology; ministers of finance, planning and other sectoral ministries and parliamentarians in developing countries; multilateral and bilateral development and conservation agencies and foundations; intergovernmental organizations such as the United Nations system; other international and regional organizations; and the private sector.

### 4. THREE PILLARS TO SUPPORT THE NICHE

The niche defined above can be very well supported by three pillars, namely: shaping the science agenda; promoting science for sustainability; and building capacity in the developing world.





#### **4.1 Shaping the science agenda in the developing world**

This would include providing advisory services to national governments for the formulation of science and technology policy and strategy, in particular promoting public investment in science and technology; initiating and supporting key international and regional science programmes; promoting science through raising awareness; awarding excellence; and forging task forces to advance frontiers of science and to address issues that are most relevant to the alleviation of poverty, the improvement of livelihoods and conservation of the environment.

#### **4.2 Promoting science for sustainability**

This would involve synthesizing cutting-edge science for decision-making on key issues that would otherwise compromise global sustainability such as adequate supply of food, water and energy; identifying possible science-based solutions to minimise environmental risks such as climate change, biodiversity loss, land degradation and natural disasters; providing policy support as a contribution to Rio+20 and other important initiatives; and providing advisory services to national governments and inter-governmental regional and global bodies, including multi-lateral environment agreements to enhance science-based decisionmaking on issues of sustainable development.

#### **4.3 Facilitating capacity-building**

Capacity-building is one of the core mandates of

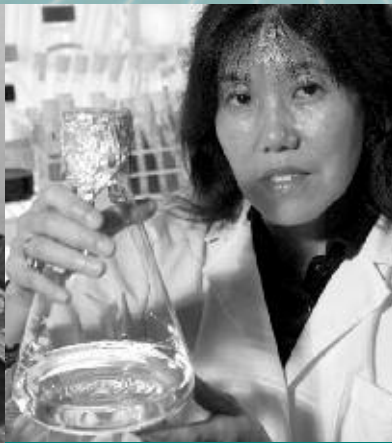
TWAS. The ultimate goal of this pillar is to build essential capacity of scientists in all developing countries to achieve their respective sustainable development goals. This would not only include building capacity of young and middle-career scientists, but also decision-makers of key government agencies. In terms of regional efforts, Africa needs to be given priority. Initiatives under this pillar include fellowships for outstanding young students and scientists, research grants, essential facilities and instruments, training of trainers, various training courses, and science education, among others.

### **5. THE WAY FORWARD**

We need bold and solid actions to turn vision into reality. On the way forward, TWAS should continue to adapt itself to the changing world, build on its strength, take on new opportunities, forge key partnerships and develop its advantages.

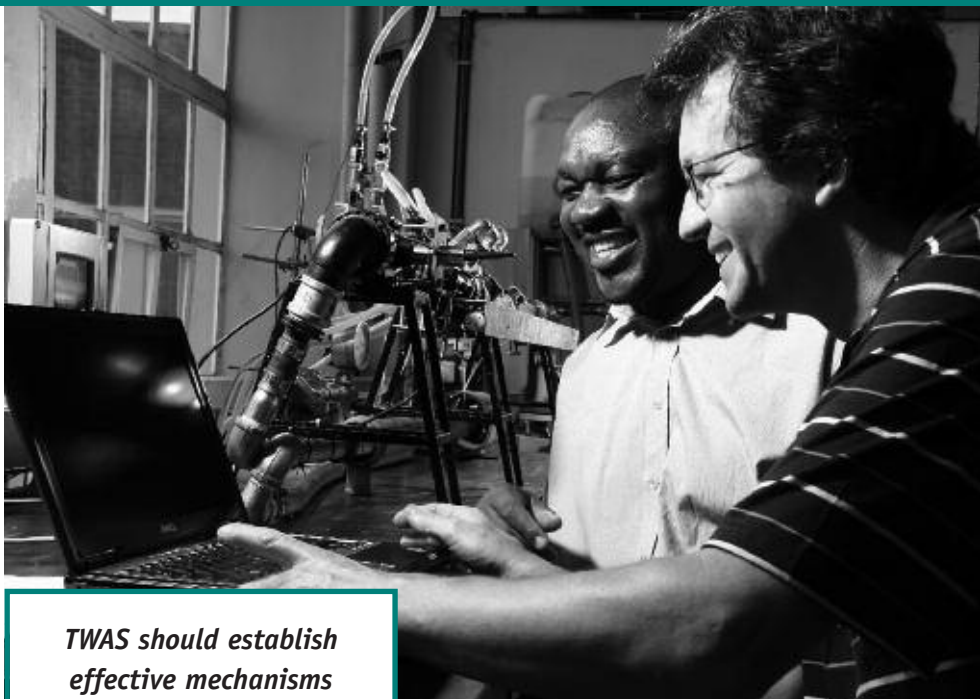
The year 2013 marks the 30th anniversary of TWAS. As an old Chinese saying goes, a man is steadfast at the age of 30, which also applies to TWAS. We need to look ahead for a new strategy to effectively build on what we have already achieved in the past three decades. This strategy must respond to the changing world and to the increasing need for science-based solutions to the social and economic challenges faced by the developing countries.

The growing scale and complexity of the challenges in sustainability call for collective wisdom from all stakeholders. No one is all-powerful, and TWAS is no excep-



tion. We need to build wider and closer strategic partnerships with stakeholders. TWAS should establish effective mechanisms for dialogue with governments and decision-makers in developing countries. We should spare no efforts in expanding our joint programmes, fellowships and initiatives in cooperation with organizations from both the South and the North.

As an elite group of scientists in the developing world, TWAS has a unique strength in the South. Yet, due to limited capacity in execution, it is still difficult for TWAS to fully respond to the increasing and diversified demands from the South. To this end, TWAS must enhance the role of its regional offices to ensure timely delivery of critical services to countries in their respective regions. TWAS's regional offices need to play a bigger, more effective role in networking TWAS Members, in TWAS's outreach in the regions and in coordinating major programmes and activities. Closer interaction and coordination between and among TWAS regional offices are greatly needed. The Academy's regional offices should be seen as effective executive arms of the TWAS secretariat in Trieste.



***TWAS should establish effective mechanisms for dialogue with governments and decision-makers in developing countries.***

The birth of TWAS was a result of the successful cooperation between the North and South, and most of the financial support to TWAS in the last three decades has been from the North. Though the support from the South has been on the increase, the North-South cooperation will remain the main channel of funding for TWAS in the years to come, and we need to spare no efforts in enhancing the North-South partnership in initiating programmes and projects in the South. Due to the economic growth of emerging economies and





their political will, South-South partnerships are emerging as a new source of funding to TWAS. Yet in absolute terms, South-South cooperation cannot – and should not – be a substitute of North-South cooperation in this regard. A triangular partnership in a complementary manner is needed to use TWAS's limited resources more efficiently.

The South and the North also need to work more closely in offering talent-training and capacity-building for the South. Special efforts should be made to help scientifically lagging countries. We also need to further facilitate interaction and cooperation between the young scientists of the North and the South. Efforts in this context will lead to better understanding and fruitful cooperation among the younger generations of scientists for the benefit of science and humanity.

Last but not least, TWAS needs to further improve its international visibility and expand its regional outreach. We need to make more governments and people in the world aware of TWAS, its achievements and activities. A continuous geographical expansion of the TWAS membership will help enhance TWAS's impacts, and we should pay due attention in nominating qualified scientists from developing countries where there currently are no TWAS members. We should take all measures in encouraging and supporting women scientists to take part in TWAS activities, and increase the number of women among TWAS members.

***We need to make more governments and people in the world aware of TWAS, its achievements and activities.***

*The Future We Want* presents TWAS not only unparalleled challenges but also rare opportunities. In addition to the report's 20 paragraphs addressing topics that are TWAS's core business, the majority of its total 283 paragraphs are related to issues of sustainability and developing countries. In brief, the central theme of this document resonates well with the mandate of TWAS. TWAS has more than enough space to execute its comparative advantages in a manner that is truly complementary to the mandates of our key partners. ■

#### References

- J. Rockström *et al.*, 2009, *Planetary Boundaries: A Safe Operating Space for Humanity*
- UNESCO Science Report 2010
- TWAS Annual Report 2011
- Rio+20, 2012, *The Future We Want—Outcome of the World Summit for Sustainable Development*, Rio de Janeiro, Brazil
- Mohamed H.A. Hassan, 2012, *TWAS and the Future of Science in the Developing World*, presentation at the TWAS 23rd General Meeting, Tianjin, China
- N. Ishii, 2012, The Global Environment Facility, *Time for Transformational Change*
- US National Science Board, *Science and Engineering Indicators 2012*
- UNESCO statistics website:  
[stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx](http://stats.uis.unesco.org/unesco/ReportFolders/ReportFolders.aspx)